THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XX. No. 489—23RD YEAR.] LONDON, JULY 4, 1871. [Subscription per Annum. { 15s. in Advance. 18s. Credit.] DOUBLE No. Price 1s.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¼ cwt. coke per ton of coal.

RAMSAY'S PATENT CONDENSED COKE.

DO. GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.

GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES. CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.

Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne; and London Wharves—Falcon Wharf, No. 80, Bankside; and Honduras Wharf, Cubit Town. Large stocks kept.

Address G. H. RAMSAY, NEWCASTLE-ON-TYNE.

GEORGE GLOVER & CO.,

Patentees of the Standard Gasometers for the Government, and of the

IMPROVED DRY GAS-METERS.

These Meters are warranted to measure correctly and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured.

To meet the increasing demand, G. GLOVER AND CO. have just entered on possession of extensive premises adjoining their present Works in Ranelagh Road, and they are now prepared to execute promptly, orders to any extent. They keep in stock all sizes of Meters up to 200 lights. In cases of haste, on the receipt of a telegram early on one day, their Meters can be delivered next day in any part of England, and in he large towns in Scotland.

Particulars and lists of prices forwarded on application to—

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238, GEORGE STREET, GLASGOW;

OR

15, MARKET STREET, MANCHESTER.

COWEN'S PATENT FIRE-CLAY RETORTS.

JOSEPH COWEN and CO.,

BLAYDON BURN, NEAR NEWCASTLE-ON-TYNE,

Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they have also been awarded in the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."

J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts in the United Kingdom; and orders for Fire-Clay Retorts of all shapes and dimensions, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.

COWEN'S GARESFIELD COALS.

Coal Office,

QUAY SIDE, NEWCASTLE-ON-TYNE.

FIRST PRIZE IN THE PARIS EXHIBITION.

JOHN RUSSELL and CO.,

THE OLD TUBE-WORKS,

CHURCH HILL, WEDNESBURY;

ALMA WORKS,

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and 69, UPPER THAMES STREET, LONDON,

Original Manufacturers of Wrought-Iron Gas-Tubes, and Holders of the present Patents; Inventors and First Makers of LAP-WELDED FLUES for Steam-Boilers.

J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water, and the largest orders may be executed in a few days.

Gun Metal, and all other kinds of Cocks, Stocks, Dies, and Taps, Galvanized Tubes, &c.

N.B.—All goods thoroughly tested before sent out, and warranted.

JOHN BENT & SON,

WET AND DRY GAS-METER AND STREET-LAMP MANUFACTURERS,

BELL BARN ROAD, BIRMINGHAM.

ESTABLISHED 1830.

All materials found for the alteration of Public Lamps for lighting with the Rod. Regulators with Lava Burners.

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NEAR NEWCASTLE-ON-TYNE.

WILLIAM COCHRAN CARR begs most respectfully to thank the Metropolitan, Provincial, and Continental Gas Companies for their patronage for several years past, and to intimate that he has rebuilt and enlarged his extensive premises for the manufacture of CLAY RETORTS; and that he is now prepared to execute the largest orders with punctuality and despatch. Orders for FIRE-CLAY RETORTS, of all shapes and sizes, FIRE-BRICKS, and all other articles in Fire-Clay, executed on the shortest notice, and on the most reasonable terms.

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SCOTTISH CANNEL COAL.

J. & W. ROMANS, Consulting Gas Engineers and Coal Factors, of Edinburgh and London, CONTRACT for supplying any quantity of COAL and CANNEL.

They are also Contractors for leasing Gas-Works, for supplying, erecting, or repairing gas apparatus and fire-clay goods.

Messrs. ROMANS, being lessees of several Gas-Works, have their Cannels tested in the ordinary working process, thus securing for their customers a guarantee beyond mere laboratory experiments.

Analysis, prices, and other information will be forwarded on application to their Offices, 8, Forth Street, EDINBURGH; 1, Walbrook, Mansion House, LONDON, or to the "Crown Wharf," Thomas Street, Limehouse, LONDON, where stocks of house, steam, and gas coal are always on hand.

Coal, machinery, fire goods, &c., shipped to all parts of the world.

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LESMAHAGO N.B.

JAMES FERGUSON & CO.

LESSEES SINCE 1832.

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LA COUR & WATSON,

LEITH.

CROLL'S DRY GAS-METER,

PRIZE MEDALS. (INVENTED & PATENTED IN 1844,) PRIZE MEDALS.

LONDON, 1851; NEW YORK, 1853; PARIS, 1855. COMBINING ALL THE LATEST IMPROVEMENTS, LONDON, 1862; DUBLIN, 1865; PARIS, 1867.

MANUFACTURED ONLY BY

THE GAS-METER COMPANY, LIMITED,

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MEDAL AWARDED, EXHIBITION, 1862, "FOR GOOD WORK."

THE IMPERIAL TUBE COMPANY, BIRMINGHAM,

MANUFACTURERS OF

WROUGHT-IRON TUBES & FITTINGS, BRASS & COPPER TUBES,

GALVANIZED & GLASS ENAMELLED TUBES & FITTINGS,

LAP-WELDED IRON & BRASS BOILER-TUBES, ETC., ETC.

Twyere Coils for Blast Furnaces, Boring Tubes, Core Bars, Gun-Metal and other Cocks, Boiler Mountings, &c.

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COOMBS WOOD PATENT TUBE-WORKS.

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MANUFACTURERS OF

HOWARD'S PATENT IMPROVED WROUGHT-IRON TUBES,

FOR GAS, STEAM, AND WATER;

[Also ORDINARY WELDED WROUGHT-IRON TUBES and FITTINGS,

FOR GAS, STEAM, & WATER, EITHER BLACK, GALVANIZED, OR ENAMELLED.

CORE BARS FOR IRONFOUNDERS, STOCKS, TAPS, AND DIES, IRON COCKS, &c.

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LLOYD AND LLOYD,

ALBION TUBE-WORKS, BIRMINGHAM,

MANUFACTURERS OF

WROUGHT-IRON TUBES AND FITTINGS

For Gas, Steam, Water, &c.

SOLE LICENSEES for the United Kingdom for the LAVENANT PATENT ENAMELLED TUBES & FITTINGS,

the Coating of which does not shell off, is a certain preservative from rust, and resists all effects of expansion and contraction.

LAP-WELDED IRON & HOMOGENEOUS METAL TUBES

For Locomotive, Marine, and Stationary Boilers.

Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools of all kinds.

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LONDON: No. 157, Upper Thames Street, E.C. LIVERPOOL: No. 63, Paradise Street. MANCHESTER: Barlow's Croft, Chapel Street, Salford. PARIS and LILLE.

ECONOMY IN GAS PURIFICATION. A PURER GAS AT LESS COST, AND GREAT SAVING IN LABOUR.

M'DOUGALLS' PRECIPITATED PEROXIDE OF IRON.

The above Oxide is now in use at some of the largest works in the kingdom, and has gained a decided preference, owing to its efficiency, cheapness, and the great saving in labour effected by its use.

It is a pure artificial Hydrated Peroxide, with an addition of only sufficient sawdust to give it the needful lightness or porosity to prevent pressure, and every particle is available for use.

In selecting an oxide, a point more important than its price, is to learn the cost of labour entailed in its use. Whilst at large works the cost of labour for purifying, where lime alone or the natural oxides are employed, is 2d. to 3d. per ton of coals, by the use of the above Oxide it is reduced to 1d. to 1½d., owing to the purifier's working so much longer when charged, and to rapid revivification—two points of special importance in the busy season.

For export to Foreign Works it is unequalled, every particle being available, and saves freight over less concentrated materials.

NOTE.—It is important to note that only the Hydrated Peroxide of Iron is useful, simple oxide being worthless. Inferior oxides show a large per centage of simple oxide, but very little Hydrated Peroxide.

M'DOUGALL BROTHERS,

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E. J. & J. PEARSON,

DELPH & TINTAM ABBEY FIRE-CLAY & BRICK WORKS,

STOURBRIDGE,

PROPRIETORS OF

BEST GLASS-HOUSE POT & CRUCIBLE CLAY;

MANUFACTURERS OF

GLASS-HOUSE POTS, CRUCIBLES, GAS-RETORTS, & FIRE-BRICKS OF EVERY DESCRIPTION.

TRADE MARK.

THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

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JAMES RUSSELL & SONS, LIMITED,

PATENTEES & FIRST MAKERS OF WROUGHT-IRON TUBES,

ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

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LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;

HYDRAULIC TUBES, BEDSTEAD TUBES, WELL TUBES, TELEGRAPH POSTS, COILS, &c.;

GAS-FITTERS TOOLS, VALVES, COCKS, &c.

THOMAS PIGGOTT & CO.,

(Established 1822,)

SPRING HILL, BIRMINGHAM

MANUFACTURERS OF

TELESCOPIC & SINGLE GASHOLDERS,

CAST & WROUGHT IRON TANKS FOR DITTO;

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

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STEAM-ENGINE BOILERS, & GENERAL WROUGHT-IRON WORK.

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ENGINEERS, WET AND DRY GAS-METER MANUFACTURERS,

BRASSFOUNDERS, & GAS APPARATUS MANUFACTURERS,

FOUNTAINBRIDGE WORKS, EDINBURGH.

SOLE MANUFACTURERS OF

Peebles' Patent Wet and Dry Gas-Meters in Tin-Plate Cases, with Tongue and Groove Joints.

IMPROVED WET METERS IN CAST-IRON CASES.

STATION-METERS, GOVERNORS, EXPERIMENTING METERS, PHOTOMETERS, PRESSURE-GAUGES, &c.

C. & W. WALKER'S GAS-VALVES.

These celebrated Valves of all kinds have been in use for so many years, and are so well known, that a description is unnecessary. They are made of all kinds to suit all the requirements of engineers.

Midland Iron-Works, Donnington, near Newport, Shropshire; 8, Finsbury Circus, London.

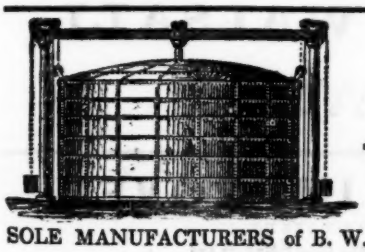
TO GAS COMPANIES, ENGINEERS, AND MACHINISTS.

NEW LUBRICATING OIL.

This Oil is suitable for every kind of machinery, being entirely free from anything liable to produce corrosion, and is equal in lubricating power to sperm or lard oil (though supplied at half the cost).

It is prepared in two consistencies—viz., LIGHT MACHINE OIL, for machinery where the pressure is moderate and the motion rapid. HEAVY MACHINE OIL, on machinery where the motion is comparatively slow. *Four-gallon Samples, carriage free, can included, for £1 1s.*

WALTER CARSON & SONS, Belle Sauvage Yard, Ludgate Hill, London, E.C.; 21, BACHELORS WALK, DUBLIN.



IMPROVED GAS APPARATUS,

FOR CITIES, TOWNS, VILLAGES, &c.,

INVENTED AND MANUFACTURED BY

W. C. HOLMES & CO.,

WHITESTONE IRON-WORKS, HUDDERSFIELD.

SOLE MANUFACTURERS of B. W. THURSTON'S IMPROVED SCRUBBER, CONDENSER, and WASHER, in use in many of the principal Gas-Works on the Continent.

PATENTEES of the IMPROVED COMBINED PURIFYING APPARATUS, so eminently adapted for Exportacion.

ESTIMATES, PLANS, and SPECIFICATIONS PREPARED for BUILDINGS and APPARATUS.

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*** *Please address letters to Huddersfield.*

REFERENCES TO NEARLY 300 GAS-WORKS.

THE FARNLEY IRON COMPANY, LIMITED,

FARNLEY, near LEEDS,

Possess special advantages for the prompt and efficient execution of large orders for

FIRE-CLAY RETORTS & FIRE-BRICKS,

Of every shape and size, and of the best quality; also for their *other productions* in Fire-Clay and Terra-Cotta, including their well-known White and Coloured GLAZED BRICKS.

The F. I. Co. have the exclusive right to make and sell Fraser's Patent "Ribbed" Retorts in Fire-Clay.

Apply as above, or at their Offices,

3, WESTMINSTER CHAMBERS, VICTORIA STREET, S.W., or at 46½, QUEEN STREET, HULL.

GEORGE NEWTON,

UNION STREET WEST, OLDHAM,

MANUFACTURER OF

IMPROVED WET & DRY CONSUMERS GAS-METERS,

GAS STATION-METERS,

With all the Joints planed,

GOVERNORS, GAUGES, INDICATORS, EXHAUST GOVERNORS, &c.

TERMS, &c., ON APPLICATION.

KING BROTHERS,

STOURBRIDGE FIRE-BRICK AND RETORT WORKS.

KING BROTHERS beg especially to call the attention of Gas Companies to the superiority of their Retorts, which are made from the celebrated STOURBRIDGE FIRE-CLAY. Mr. King has patented a Kiln for burning Retorts, by which Patent all Cold Air is excluded from the Kiln while burning, thus rendering them FREE FROM CRACKS AND CORRECT IN FORM. By great care in Manufacturing, combined with the advantages in burning, a VERY SMOOTH SURFACE is obtained, rendering them less liable to carbonize.

Retort Ovens, Fire-Bricks, Guards, Saddles, Rabbitted Burs, Flues, and Quarries, are all Manufactured of the same quality of Clay.

Every Retort and Brick is branded "King Brothers, Stourbridge."

Agent in Ireland—Mr. JAMES FURNESS, No. 3, FOWNES STREET, DUBLIN.

1862.

PATENT ANTIMONY PAINT.

MADE ONLY BY

GEORGE HALLETT & CO.,

296, ROTHERHITHE, LONDON, S.E.

CLASS II.

This Paint having been in general use over nine years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced for resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known.

It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (30s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.

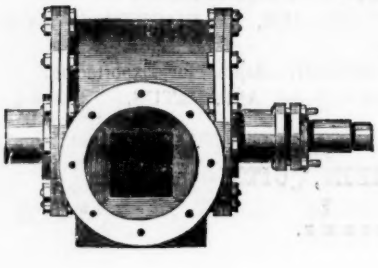
Reference is kindly permitted by the Engineers of the City of London, Commercial, London, and Surrey Consumers Gas Companies, who pronounce it the best Paint known for their purposes.

N.B.—Antimony Paint, COVERING SO MUCH MORE WORK, costs about 20s. per cwt., as compared with White Lead at 30s. per cwt.; a similar economy arises from its use in Steam and Gas Joints, for which purpose it is superior to White Lead.

LAMBERT BROTHERS, WALSALL.

ALPHA TUBE & FITTING WORKS

BEALE'S GAS-EXHAUSTER IMPROVED.



FROM 250 TO 250,000 CUBIC FEET PER HOUR.

Since Mr. BEALE'S retirement, the Oldest Makers are

J. BURTON, SONS, AND WALLER,

MAKERS OF ENGINES, MACHINERY, and IRONWORK for GAS-WORKS.

Efficient and durable TAR, LIQUOR, and SYPHON PUMPS.

GAS-VALVES in stock, 2 inches to 30 inches.

SELF-ACTING BYE-PASS VALVES, with Lid and Relieving Lever,

ROTATORY, TUMBLER, and CAPILLARY WATER DISTRIBUTORS for SCRUBBERS.

EXHAUSTERS from 3000 to 30,000 per hour in stock.

HOLLAND STREET, BLACKFRIARS, LONDON, S.E.

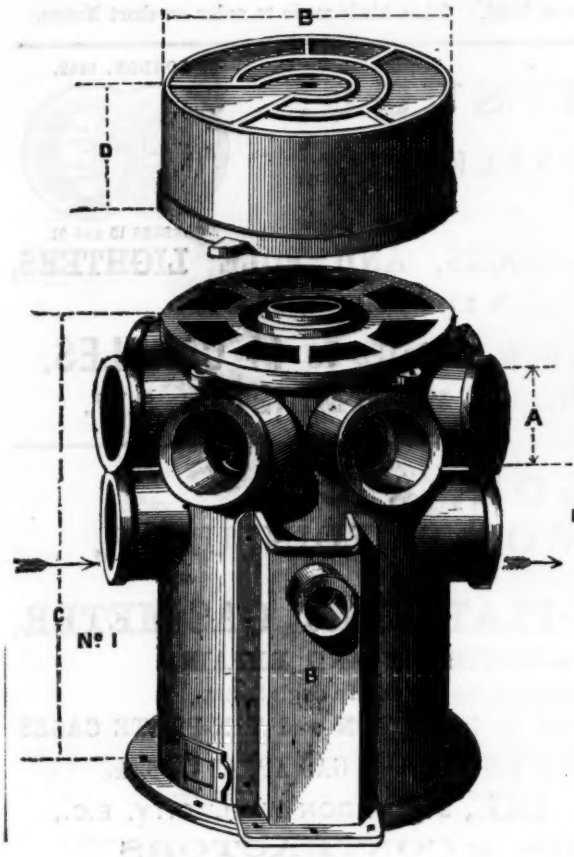
Between Blackfriars' and Southwark Bridges.

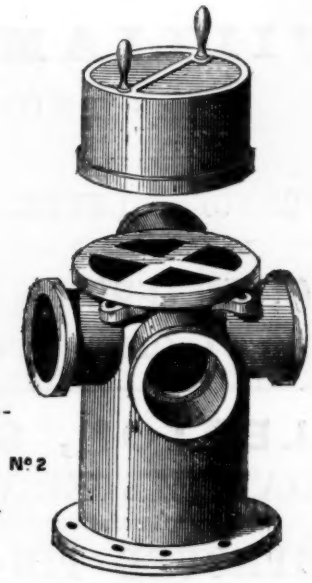
THE THORNCLIFFE IMPROVED CENTRE-VALVE,

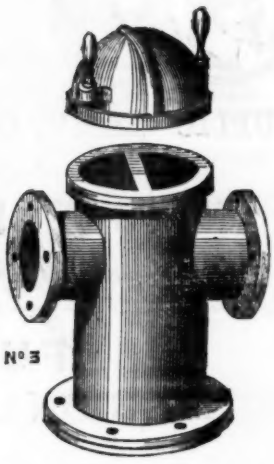
MANUFACTURED BY

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.







Sizes of the

THORNCLIFFE IMPROVED CENTRE-VALVE.

		Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
A	Bore of Pipe...	4	5	6	7	8	9	10	12
B	Diam. of Body.	16	20	23	26	28	31	34	40
C	Height of Tank.	33	35	38	43	46	48	51	56
D	Depth of Cover.	8	9	10	11	12	13	14	16
	Total height...	41	44	48	54	58	61	65	72

THORNCLIFFE

IMPROVED

BYE-PASS VALVE.

SIZES

From 3 ins. upwards.

THORNCLIFFE

IMPROVED

STOP-VALVE.

SIZES

From 3 ins. upwards.

In all cases the Covers are cast heavy enough to resist any required pressure.

The advantages derived from the adoption of these Valves are so manifest and cardinal that in the immediate character of the change—the simplicity of the machine—the facility affording for cleaning out connexions between Valve and Purifier—the perfect collection and delivery by suitable overflow of the ammonia, at a greatly diminished depth from ground-line over the old form of Valve—the advantage of connecting on the same level, and at any angle, or opposite to each other, the inlet and outlet pipes without dip or rise—the clear acquisition of space in the purifying-house, by being able to place the boxes nearer together, the new Valve being entirely under the floor—and lastly, though of the greatest importance, the passage of crude and unpurified gas during the change is minimized to the merest fraction, thus preventing the fouling by impure gas the delicate machinery and easily affected exposed movements of the station-meter, thereby preventing the introduction of the enemy (unpurified gas) into the gasholder. Also a dead abutment is offered to all back pressure, imparting thereby to the gauges, governors, and hydraulic seals, a steadiness of action never realized with the once famous, but now fast becoming obsolete, Hydraulic Centre-Valve.

These Valves may be made of any size to suit any position of boxes, to stand any amount of pressure, warranted and tested with gas before leaving the manufactory, prepared to work any number of boxes in rotation—say, two, three, four, five, six, or eight—and for all Valves above 12-inch ports a suitable rack-and-pinion movement is attached if preferred. These Valves (specially arranged) are applicable to inlet or outlet pipes of gasholder, to act as Bye-pass Valves to meters, governors, exhauster, condensers, scrubbers, washers, driers, and duplicate systems of hydraulic main; also to act as Stop-Valves on special mains about the works. Where it is important no impediment be offered to tar or ammoniacal liquor, the same having uninterrupted flow to the general tar-well on the works, and for which purpose the slowly changed, often disordered, and at all times obstructive Slide-Valve (challenging the best of them) is superseded by the exceedingly simple, instantaneously changed Dome-Top Valve, which also carries so marked an index, whether open or shut, at any distance from close observation, providing the Valve can be seen at all. See sketch in perspective, No. 3.

London Office—34, LONDON WALL, MOORGATE STREET, E.C.

JOHN HALL & CO.,

STOURBRIDGE,

MANUFACTURERS of FIRE-BRICKS, LUMPS, & TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

PARIS, 1867.

CLASSES 24 and 53.

WILLIAM SUGG,

GAS ENGINEER.

LONDON, 1862.

CLASSES 13 and 31.

PUBLIC LAMP GOVERNORS, LEVER COCKS, AND POLE LIGHTERS,

LAMP METERS AND BOXES.

LOWE'S JET PHOTOMETERS CAN NOW BE RATED TO 14 CANDLES.

VINCENT WORKS, VINCENT STREET, WESTMINSTER, S.W.

FULLERTON, SON, & CO.,

LONDON ROAD METER-WORKS, EDINBURGH,

SOLE MANUFACTURERS OF

THE PATENT IMPROVED TIN-PLATE DRY GAS-METER,

WITH SPECIAL FACILITIES FOR ADJUSTMENT AND REPAIR,

The principal parts of the mechanism being accessible by the removal of a single Screw.

GAS-METERS on the WET and DRY principles made in CAST-IRON and TIN-PLATE CASES.

STATION-METERS, GOVERNORS, EXPERIMENTAL & TEST METERS, GAS APPARATUS, &c.

LONDON AGENTS: THORNELOE & CO., 34, LONDON WALL CITY, E.C.,

GAS & WATER ENGINEERS, & CONTRACTORS

FOR GAS & WATER WORKS APPARATUS.

SHOW-ROOMS AND WHOLESALE WAREHOUSE FOR

Wrought-Iron Tubes and Fittings for Gas, Water, and Steam; Chandeliers, Pendants, Lamps and Brackets;

Plumbers Work, Water-Closets, Pumps, &c.; Lead, Composition, Brass, and Copper Tubes.

METERS SUPPLIED TO ORDER FROM STOCK.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS AND COLLIERIES,

NEAR SHEFFIELD.

CELEBRATED SILKSTONE GAS COALS.

Analyses by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

Description.	Cubic Feet of Gas per Ton of Coals.	Illuminating Power in Candles.	Coke per Ton of Coal used. Cwt.	Ash in Coke per Cent.	Sulphur in Coa per Cent.
Best Silkstone . .	10,900	17·0	12·8	2·6	1·7
Norfolk Silkstone . .	11,000	15·94	12·5	4·4	1·64
Silkstone Brights . .	11,500	14·5	12·6	7·4	1·85
Silkstone Nuts . .	10,800	15·85	12·66	6·0	0·69

NOTE.—The illuminating power of the Gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

OFFICES, 34. LONDON WALL, CITY, E.C.

TANGYE BROTHERS & HOLMAN,

10, LAURENCE POUNTNEY LANE, LONDON, E.C.;

And BIRMINGHAM (TANGYE BROS.), CORNWALL WORKS, SOHO.

SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS.

Over 1000 of the Patent Retort-Lids and fastenings already supplied to the great works of The Gas Company at Beckton.

Several hundreds in use at the works of the London Gas Company.

FIG. 1.

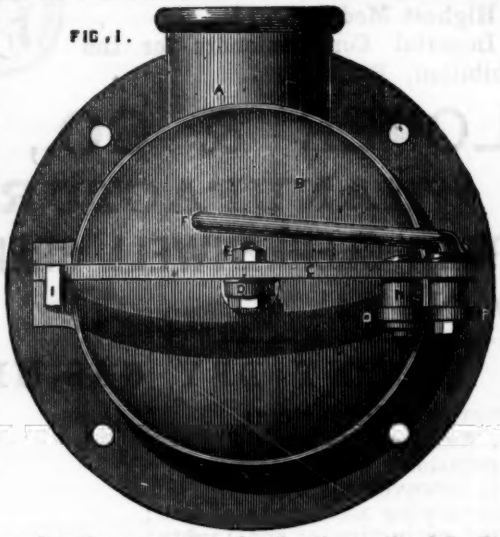
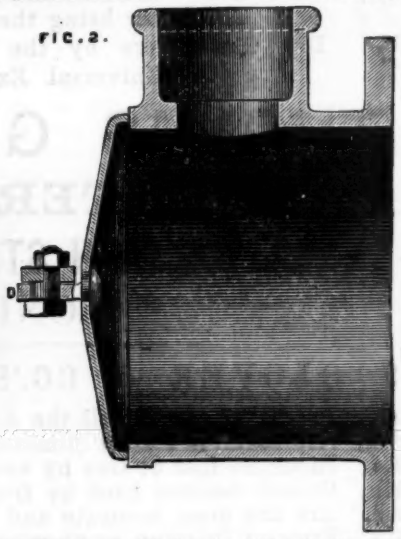


FIG. 2.



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Ipswich Gas-Works.
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Woolwich Equitable Gas Company.
Western Gas-Works, Kensal Green.

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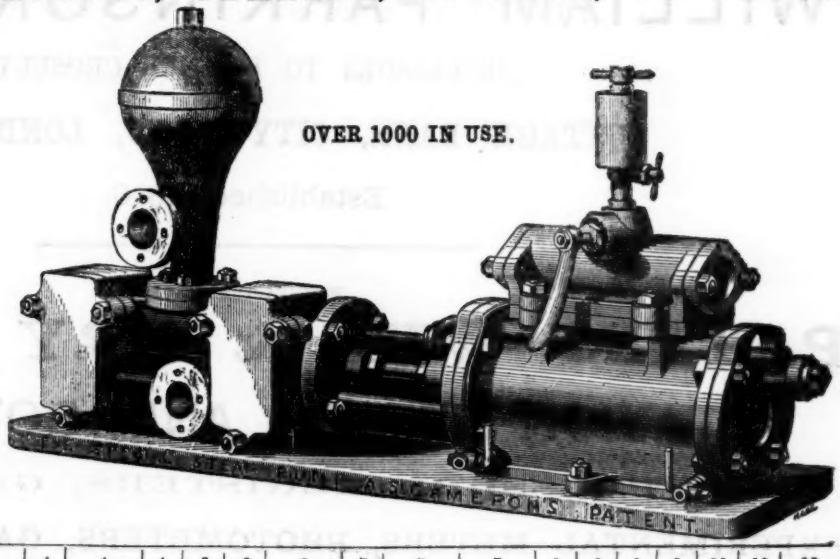

Diameter of Steam Cylinder . . .	In.	2½	3	3	4	4	4	6	6	6	7	7	7	8	8	8	8	10	10	12
Diameter of Water Cylinder . .	In.	1¼	1	3	2	3	4		4	6	5	6	7	4	6	7	8	6	7	8
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TUESDAY, JULY 4, 1871.

Notes upon Passing Events.

At length the bureaucrats of the Woods and Forests have fairly put themselves in opposition; indeed, if we read the last reports of Messrs. Gore and Howard aright, have defied the power of the House of Commons. This is well—it could not be better—for until such a collision took place, these zealous, industrious, narrow-minded authorities were sure to have their own way. Messrs. Gore and Howard, with their substantial staff of permanent solicitors and surveyors, remind us very much of people occupying the same position on a weak-minded and wealthy nobleman's estate, for whose good, as they say, they tyrannize alike over landlord and tenants. But one day the nobleman marries a strong-minded woman who very soon teaches the busybodies that my lord not only can but will do as he likes with his own. We do not know much of the bureaucrat *pure and simple* in this country. In Germany the people are familiar with and accustomed to the race. They are often very honest men who love power more than money, and are prepared to sacrifice anything and any one to their own peculiar crotchets and privileges. We once heard a Berlin Democrat of 1848—since a devoted follower of Prince Bismarck—say, "There is a great pleasure in making rich mer-"chants wait in your antechamber and submit to your wishes and "orders, right or wrong." This is what the Woods and Forests officials enjoy. The Crown is their "Jorkins," and in the name of the Crown they insist on the most outrageous demands, and extort the most extravagant compensation. The Woods and Forests were not heard to protest when, by a most abominable job, the lease of the site of Montague House was renewed at a nominal rent to the Duke of Buccleuch. It ought to have been reserved for the extension of public offices, then and long contemplated. The Woods and Forests have not only backed up the Duke of Buccleuch in his claims for compensation for the loss of water privileges he never used, but hastened to bestow on him the land reclaimed at the lowest possible rent. The Woods and Forests never interfered to prevent the Carlton House Riding School being leased for a song to speculating builders, who raised up a permanent barrier to any improvement between Charing Cross and the Green Park. But the Woods and Forests, by extravagant claims on the part of Crown lessees, deferred the Hamilton Place improvement for three years. The form of opposition wherever Crown lands or Crown claims, however intrinsically worthless, are concerned, is familiar to every one who has ever attempted to interfere with the muddiest, barrenest foreshore, by constructing a pier, a dock, or a railway. The representatives of the Woods and Forests appeared with a string of clauses, which were to be accepted whole and without discussion, or the Bill was to be opposed with all the weight of Crown influence. The Woods and Forests no longer possess this power as regards foreshores, but their spirit is the same. Every one knows how stupidly landed estates are managed that are under the control of mere attorneys ignorant of agriculture, and of all the advantages of liberal expenditure on the part of a landlord. To refuse to drain or to erect farm-buildings necessary for modern cultivation, even on payment of interest; to object to the removal of hedgerows and useless trees; to forbid the use of reaping by machine, and to regulate the trimming of hedges—these are among the eccentricities of a class of agents who are faithfully reproduced at the Woods and Forests. Mr. Howard reports, with the approval of Mr. Gore, that the only proper method of dealing with Crown lands is to deal with them "as any private owner would manage "his estate, so as to make them produce the largest annual "return." That is theory. The practice is to be extremely liberal in dealing with any individual tenant of the favoured governing class, and to drive the hardest bargain possible where any public work or public accommodation is concerned.

As regards the case of the North Thames Embankment, it is very fortunate that, under our system of parliamentary government, the opposition, Conservative, Aristocratic, and Squirarchal though it be, feels that it is its duty to oppose the Government on every feasible occasion. Had Lord John Manners been in office, supported by his own party and the ex-officials of Whig tendencies, the supporters of equity and common sense might not have made so good a fight as they did, with Conservative Smith as leader. As far as the facts of a very hard bargain go, Mr. Gore has the best of the argument in his report on "The claims of the "Crown and the Consolidated Fund under the Thames Embank-"ment Act of 1862." The Act was obtained by the Metropolitan Board before that representative body was well warm in its seat—before it could afford to quarrel, or even to differ, with such high and mighty personages as the solicitors, the surveyors, much less the Commissioners of Woods and Forests. The Metropolitan Board had only to hear, and at once accept the terms dictated by Mr. Gore. These terms were embodied in the Act, and, if one Act of Parliament would not repeal another, there would be no more to be said, although they were in principle extortionate and extravagant. When so grand an improvement as the Thames Embankment was contemplated—an improvement which added so much to the value of Crown property in Westminster—the proper principle would have been to charge for property destroyed in the shape of wharves, but nothing for the imaginary value of unused mud-shores. On this principle, in dealing with railways, the Duke of Bedford, the late Earl of Yarborough, and Earl Maynard have acted, selling land for agricultural prices. Spreading before us the map attached to Mr. Gore's report, we find that he claims immense credit for surrendering, without money compensation, the block between Westminster Bridge and Charing Cross Station, actually required and occupied by the road and main sewer, and the block between the road and Somerset House, which could by no possibility be turned to any profitable purpose by the Crown without disfiguring Somerset House, for even Mr. Gore could not pretend that, under any circumstances, he could have made a wharf in front of Somerset House. As to the water pri-

vileges, with the exception of the Northumberland Wharves, they had long been of declining value. One wharf, near the Temple, had been so long unlet that its owners found it better to let it to a printer, and it is notorious that an adjoining manufactory did all its work by railway vans. So that, in fact, all that the Crown surrendered without *money* compensation was two blocks actually required for the purposes of the Embankment—viz., the road and the sewer, the Crown receiving the benefit of the operation, and the land given up to the Crown lessees at a nominal rent. Thus a mere inspection of the map proves that Mr. Gore, as a zealous servant of his department, drove the hardest possible bargain with the then feeble Metropolitan Board. The Board, by its own act, is stopped from any claim on the Woods and Forests; but the ratepaying public, so vigorously represented by Mr. W. H. Smith, has only to produce Mr. Gore's map to show the Shylock-like nature of the bargain, and to claim the revision of a contract made with a weak trustee under duress.

The New Forest case is not so strong, but strong enough. The Forest, as long as our fleet was built of heart of oak, was considered of special value as a resource for timber. That is gone by. A few hundred pounds represent the value of timber purchased by the Admiralty within the last twenty years. The idea of the Woods and Forests authorities was to turn the Forest into a private enclosed estate, after compensating in the usual manner the 860 persons who are entitled to pasturage for six months in the year, to feed pigs for two months in the year, and to dig and cut marl, heath, and turf for fuel; the last being, agriculturally considered, a suicidal process, which ought to be peremptorily abolished in these cheap coal-carrying times. During the long wars which followed the French Revolution, enclosure of wastes was carried on at a tremendous rate, greatly to the advantage of the nation in increasing its productive resources in corn and grass, although often with great hardship, and even cruelty, to the smaller commoners and inhabitants of neighbouring villages. That resource has been worked out. We no longer dream of feeding ourselves from home growth. A reaction has risen up which makes the multitude, high and low, which dwells in towns, and which, thanks to railways—*pace*, Mr. Ruskin—travels so easily east, west, north, and south, impatient at seeing so many wastes, once free to every traveller and every village boy, fenced in for the benefit (chiefly) of the next landowner, either as a game preserve or a building speculation. To the bureaucrat of Mr. Howard's temperament, who claims to do as he likes with the Crown's own, this feeling affords room for intense enjoyment. To cut down an ornamental glade of unprofitable but picturesque yew trees, and to replace them with hideous lines of Scotch firs, that will be worth something as railway sleepers in half a century—if wooden sleepers are then used—is quite delightful; still more delightful, to put a fence up and lay the foundation of a future shooting preserve for some Royal Prince, in the teeth of discontented commoners. But in these days Royalty cannot afford to be unpopular in order to increase the patronage of a Commissioner of Forests, still less in order to lay the foundation of a landed estate on a waste and forest; especially as the operations of the Woods and Forests in reclaiming waste lands like Hainault Forest have usually ended in expending the value of the fee simple, when improved, on the improvements. The safe remedy for the despotic eccentricities of these commissioners is to make the Chancellor of the Duchy of Lancaster, or some other official with a seat in the House of Commons, responsible for the Woods and Forests. Even Mr. Ayrton has had to modify his natural despotism under the influence of parliamentary criticisms, questions, and retorts.

The promoters of tramways in London are going through exactly the ordeal that the promoters of railways had to endure after the first brilliant triumph of the Liverpool and Manchester had floated schemes for the whole kingdom. The London and Birmingham line was only half completed when canal interest raised its head again, and, on the strength of the reported financial and mechanical failure of railways, originated schemes for more canals and opposition to railways. The coaching interest, the roadside hotel interest, the farmers and little squires, joined the cry, and the Anti-Corn-Law Duke of Buckingham received a service of plate—which went, in due course, to the pawnbroker's—for driving the Great Western away from the towns in the valley of the Thames. The same cry meets the tramway companies. All sorts of real and imaginary objections are raised against their use. As to one objection, there is little doubt that it would have been a good arrangement if the Local Boards under the Metropolitan Board had undertaken the construction of the needful lines, and leased them out to companies to work. The Metropolitan Board was willing to do its part, but it soon found that the ratepayers were not prepared to enter into such a speculation. It is also quite certain that the construction of a tramway does render a good road, to a certain extent, inconvenient for private carriages. At turns round the corners of streets the rails must be raised on one side above the level of the road; again, the road has an inevitable tendency to work into furrows at the junction of the common road and the tramway road; but, admitting these drawbacks, which require careful driving when private or light carriages cross tramways, the advantages of public carriages lofty, roomy, easy to enter or quit, travelling silently without rumble or rattle, with punctuality and despatch (for lingering and loitering on a tramway is impossible), are so great that the public will very soon insist on their extension to every thoroughfare of sufficient width. Where an important thoroughfare is too narrow for a tramway, that is a reason for widening the street, not for stopping the course of this special street railroad. But the public can afford to wait. The prejudice against tramways is not greater than against omnibuses when they were first introduced. One incidental advantage of the conquest of the tramways is that it ensures good roads. Where they come there can be no raw macadam to be ground down at the expense of public and private carriages, a complete well-finished road must be made before the tram is worked. That the Local Boards secure in their special bargains. We are surprised that some one did not remind the country gentlemen who followed Mr. Beresford-Hope into the lobby that it is only in London that private carriages escape ruts; they are the normal condition of many—we might say of most—parish roads. It certainly was not the gentlemen who spend their time in coachmanship who established the railway system against landed opposition, and their opposition will not permanently impede tramways. Some foolish persons, who know nothing practically about the question, are proposing that tramways should be rendered unnecessary, by the universal introduction of asphalte. This is truly absurd. An asphalte road, well kept, presents an admirably smooth and silent surface; but, in the first place, the expense of asphalte puts its substitution for macadam out of the question; asphalte cannot be used wherever the steepness of the descent requires the use of a drag for omnibuses; and, asphalte pavement, unless cleaned by the street orderly system, is most dangerous to travel upon—quite as slippery as ice. The advantage which will, within a few years, carry tramways all through London, is, that the improvement is done without cost to the residents, or that, if executed by the district, the rents of the companies plying on it repay the cost with interest. To asphalte the main thoroughfares of London would cost millions, which the ratepayers must pay, without hope of return from either public or private traffic. If either the Metropolitan Board, or the District Boards, or private companies under terms, choose to make tramways, they reasonably expect to be repaid the principal and interest from the working, and in the latter case, under the terms enforced by the Board of Trade regulations, the District Boards may buy up the tramways at the end of a term which will have proved whether the undertaking is profitable or not. But who is to bear the cost of remaking in asphalte all the main streets and roads of London? All men—high and low, Conservative and Radical, fashionable and common—are selfish. The residents in houses not yet disturbed by an omnibus traffic, who ride in carriages—marvels of modern art for grace and lightness, unlike, in every respect, the mail coach, with perches and springs, smooth but ponderous, of our fathers—and the shopkeepers, who dread that a tramway would carry away customers, who now dawdle along the foot-pavement waiting for an uncertain conveyance—are alike opposed to any change from the system that now suits them perfectly. A session more or less will make very little difference to the street public. If the thing is good, it must come in spite of Mr. A. B. Hope and the *Times*; if it is a failure, which we shall soon know, we are better without it, and it will die out, like the atmospheric railway, bicycles, and other ingenious fooleries of the same character.

We are still waiting, with a good deal of curiosity, for the debate in the House of Commons on the action of the Endowed Schools Commissioners. The Bill for enabling the Charity Commissioners to alter and reorganize charity funds, without application to or consent of existing trustees, having been withdrawn, the Liberal M.P.'s for the metropolis are for the present spared the necessity of "turning their backs on themselves," according to Lord Castlereagh's celebrated phrase, and arguing that what was sauce for the Irish goose is not sauce for the City of London gander. The Lords, led by Lord Salisbury, have decided that the Lord Mayor and Aldermen ought to retain the patronage of the charity boys of Emanuel Hospital. Lord Salisbury is consistent; he believes in patronage, and objects to promotion by merit. He also believes in life-elected aldermen.

A long, formidable string of names of masters of nearly all the more celebrated schools in England, published the other day, approved of the principles, recited, on which the Endowed Schools Commissioners were acting; and certainly it will be very difficult for the educational reformers, who are so numerous on both sides of the House, to resist this statement. Of course, the representa-

tives of what we call Eldonism—after Lord Eldon—approve of stagnation in every shape, and especially protest against disturbing any charity dunghill, although undisturbed it only stinks, while spread it would fertilize many mental acres. The theory sanctioned by Parliament, at the shrine of which so many city and borough school preserves are to be sacrificed, is simply that the primary education of every boy and girl in the kingdom, from four to thirteen years of age, is to be provided in rate-aided or poorhouse schools, and enforced on parents. This will prevent two scandals of British civilization—first, the utter ignorance of the children of destitute or vicious parents; secondly, the intentional neglect of children of well-to-do parents, some of whom, waiting until their offspring are elected into some patronage charity, give them no education at all, expecting that its advantages will come to them as soon as they put on the green, brown, or blue livery. In London, it is as common to meet with the sons of people earning good wages unable to write or even read decently, because they are waiting for a presentation to a charity boarding-school, as it was formerly to meet fine-looking, ignorant young gentlemen, the sons of exiles, at Boulogne or Dieppe, waiting for a commission. Next above the rate-aided schools will appear the reformed endowed schools, managed by elected and *ex officio* trustees, responsible to the education department, acting in public, keeping and publishing the records of elections, as well as regularly audited accounts. To these superior schools, whether clothing and boarding pupils or not, admission will be obtained by boys and girls who have received their elementary education in rate-aided schools, partly by election on special claims under the trusts of the original charity—never by the individual patronage of one trustee—partly as a reward for superior diligence in inferior schools, and partly by payment. In these endowed schools considerable sums, now uselessly dribbled away, will be devoted to still further reward in scholarships and money prizes the most industrious and the most able, so as to enable them to enjoy, at a third remove, the best education—practical, scientific, or literary—the country can give. Under this scheme of the Council of Education and the Endowed Schools Commissioners, aided by a reform of all the misused and torpid charities in the kingdom, every working man and every needy man of every class will be able to obtain as much education as his childrens intellect will enable them to imbibe before the time comes that they must work for their living. The orphans and very needy, not being absolute paupers, will, in certain districts, have a fair chance of election to special boarding-school charities. The really clever and industrious will be able, however humbly born, to run through all the schools, winning profitable rewards, and landing on the highest educational platform. And this is the scheme which, because it deprives them of personal patronage, and introduces publicity and responsibility into their proceedings, certain parsons, parochial authorities, and aldermen of advanced religious and political opinions (outside the City of London) denounce as confiscation, and couple with that other crime of the Government—the attempt to limit drunkenness and the unhallowed profits of publicans!

Amid the frantic cries raised by the habitual—we might almost say professional feeders at the Court and Livery dinners of the City companies—threatened with investigation by the Charity Commissioners—not the least comic is the howl in favour of "charity" and "the Christian virtue of hospitality." It is only to the Common Council mind that the idea could have occurred of terming hospitality giving dinners that cost you nothing to some one who is sure to do the same for you at the same expense, except when the rank of a distinguished guest adds flavour to the dishes and brilliancy to the plate. As to the charity of bestowing in education, pensions, or doles, funds that you cannot in decency eat or drink, it reminds one of a sympathetic and economical gentleman, who, much moved by an eloquent charity sermon, said to his friend, "Tom, we "really must give something. I will put that sovereign I owe "you into the plate; it will do for both of us!"

When the weather is favourable, there is not a pleasanter gathering in the whole year than that of the Royal Agricultural Society, which is now open in the eminently manufacturing district of Wolverhampton. The great fair, to use an appropriate American term, combines business and pleasure in very agreeable proportions, brings together landlords and tenants on a common ground of equality which does not exist in their respective parishes, gives farmers—still, in spite of railroads, the most stay-at-home of the easy classes—a good reason for travelling, an opportunity for mixing with a large and congenial world, and gathering new ideas on the progress of the manufactures in which they are so deeply interested. Within a limited enclosed area, extending over a good many acres, the best specimens of farm live stock of every description are exhibited for a shilling in their most attractive condition, with ample facilities for discussion and comparison of the merits of respective breeds. On a still larger area are displayed, with all the skill of practised salesmen and advertisers, every kind of implement and machine used in agriculture, or likely to be required by the agriculturist, affording altogether a magnificent, but not unfair, idea of the progress which British agriculture has made within the last forty years. It should be remembered that all the improvements within that period of live stock are of British origin; for improved neat cattle, sheep, and pigs, continental Europe is indebted to England. So, too, all the improvements in agricultural implements and machinery, except the reaping-machine which is American, are due to English mechanics, for the most part trained to the factories which railways created, and executing on sound mechanical principles ideas that had long been nourished in agricultural bosoms. If we desired to produce a favourable impression of the hospitality, geniality, ingenuity, and perseverance of our race, we should take the intelligent foreigner to a show of the Royal Agricultural Society. The newspapers, as in duty bound, record at considerable length the trials of various machines and implements for the prizes offered by the society. This is a piece of superstition which agriculturists—the most Conservative of all races in all countries—still retain, chiefly for the importance the awards give to the gentlemen who award them. Whatever might have been the case in the anti-railroad period, at the present day the British farmer needs no council or judge to tell him what machinery is best for his purpose. The trials he relies on take place in his neighbour's fields. The proof of this is that, except where something in the way of a race takes place, the trial fields are almost deserted—the judges are left alone in their glory. This is common sense. There are few implements, and no machines the value of which can be tested in any reasonable time of trial. We never hear of the competitive trials of locomotive machines, or sewing-machines, or printing-presses, or any of the million productions of mechanical engineers.

Last year there were trials for chaff-cutters and wool-pulpers, and prizes were duly awarded to the firms who have carried them off for the last twenty years, without producing any effect except a new advertisement. The same few firms compete for ploughs, harrows, threshing-machines, and portable steam-engines year after year, and announce in large letters alternate successes. The same firm has, since steam cultivation commenced, invariably carried off the first prize.

The Royal Agricultural Society has long ceased to teach real farmers, because they have outgrown their amateur instructors; but it exercises a most useful influence, not only on this annual fair and exhibition, which affords what other exhibitions often want—a real lively class interest—but it is also a great school and recruiting-office for young landlords, freshly caught on leaving the University, and introduced to the best men in the pursuit in which they have so large a stake. Even the most unagricultural of the well-to-do classes should visit a royal show once. Fine animals, excellent and ingenious machinery, fine men, fine women, and a general air of jollity make it as good, and something better, than a racecourse. The shilling excludes squalor and mendicancy, which so spoil our non-policed open-air amusements; and gambling has no place there.

Circular to Gas Companies.

We print in another column the Bill referred to in our last, as brought in by Mr. Leeman, the member for the city of York, entitled, "A Bill to authorize the application of the Borough and "other local Funds of Municipal Corporations, and other local "Governing Bodies in England and Wales, in certain cases." Our readers will see, on perusing it, that it is a measure which more seriously threatens the interests of gas and water companies in England and Wales than any to which we have hitherto directed attention. Introduced on the 16th of June, it was read a second time on the 30th, with the understanding that it is to be referred to a select committee.

As we anticipated in our last, the operation of the Bill is not limited to municipal Corporations, strictly so called; but the term "governing body" is made to include Boards of Health, commissioners, trustees, and, in fact, every other body acting under any Act of Parliament in places or districts having not less than 5000 inhabitants. Notwithstanding a speciously drawn preamble, and the wide provisions of clause 2, which will make the local public fund chargeable with the cost of promoting any measure which, in the opinion of the governing body, will be for the public benefit, or of opposing any Bill which may be considered injurious to the public, there is no disguising the fact that the direct object of this Bill is to empower governing bodies of all sorts to expend public money in harassing gas and water companies. The exact wording of the clause, however, is too remarkable to be passed over. It says, "any Bill or Bills with "relation to any market, exchange, hall, courts of justice, tram-"ways, slaughter-houses, gas-works, water-works, or any other "matter, &c." A curious omission is to be noticed here. Nothing

is said specifically about railways, surely not the least important matter which might call for the attention of local authorities. Are they to be excluded from the operation of the Act? It is not without surprise that we notice this omission, which ill-natured and suspicious people may be inclined to explain by the circumstance of Mr. Leeman's intimate connexion with the railway interest.

The proviso to clause 2, which is intended to secure the vote of an absolute majority of the governing body before any expense can be incurred for promoting or opposing a measure, is calculated to afford but little protection either to companies against persecution, or to ratepayers against a misapplication of public funds. If local authorities, or a majority in them, could by any stretch of the imagination be supposed to have nothing but the public interest at heart—if they never had private interests to serve, never private enmities to gratify—the proviso might be useful; but as it stands here, even in connexion with the following clause, which gives the minority power to appeal to the Home Secretary, the protection appears to us altogether inadequate. We are no great advocates of *plébiscites*, but there are times when it is desirable to have a clear expression of the opinion of the constituent body, and, unfortunately, the law makes no provision for the dissolution of a Local Board to obtain this expression.

The last clause in the Bill, if it should pass into a law, will be almost unprecedented in legislation, for it makes the provisions retro-active. The object of this is apparent enough. The special intention of this Bill is to relieve the members of the Corporation of Sheffield from the difficulty they are placed in by the recent decision of the Court of Queen's Bench; and Mr. Leeman may also have had in his mind the case of the Sheerness Local Board, and also that of the Whitby Corporation, to which we shall presently have to refer.

We have said enough to show the extreme danger which this measure is fraught with to gas and water companies, and must express our surprise at the lukewarmness which up to this time has characterized the opposition. Practically, the opposition has been limited to the Sheffield companies, who naturally are most alive to the danger the measure threatens. In the meantime, we see that among municipal bodies the most lively interest is felt in promoting the success of the Bill. We are informed that on Friday last a meeting was held which was attended by seventy town-clerks, and at which it was resolved to give the most energetic support to the measure. It is not surprising that town-clerks should unite to further the Bill. The prospect it opens to many of profitable employment, and to all of lengthened visits to the metropolis, in which some work is agreeably diversified by good living at other people's expense, is too pleasant to be resisted. But, on the other side, the prospect opened to gas and water companies can only be dark and threatening. If the bill should pass, it is not likely that any company will go to Parliament without having to encounter opposition; and all companies will be liable to be persecuted by the applications of hostile "governing bodies" to Parliament. The wider effect of such legislation as this, too, deserves consideration. Everything that tends to unsettle the conditions of a commercial undertaking must tend to discourage private enterprise, to which we owe almost every gas undertaking in the kingdom; and, further, any loosening of the purse-strings of Corporations must inevitably conduce to the promotion of corruption and jobbery. Unfortunately, a measure of this kind attracts but little attention from the general press, and special steps should be taken to enlighten ratepayers as to the probable effects of the measure. The Bill, if carried, will perfect the immunity which Corporations, or rather members of Corporations, enjoy from all the consequences of wrong-doing. Many years ago Lord Chancellor Thurlow coarsely described a Corporation as having neither a soul to be saved nor a part of the body to be kicked, and therefore free to do as they pleased, without fear of the consequences either in this world or the world to come. There has been, however, one check on individual members—the pecuniary responsibility their votes might involve. This check Mr. Leeman's Bill now proposes to remove, and ratepayers had better look to it.

The amendments to the Gas-Works Clauses Act (1847) Amendment Bill (No. 2), proposed by Lords Cowper and Redesdale, have been introduced into the Bill, and it has been sent back to the Commons for their approval. No opposition is likely to be made to the amendments. The proposal of Lord Wharncliffe, to make gas-rents due to municipal bodies preferential claims in case of bankruptcy, like rents and taxes, does not seem to have been adopted, the Lords probably thinking that if municipal bodies trade they ought to be liable to the same risks as other traders.

A Commons committee has reversed the decision of a committee of the Lords, by rejecting a Bill promoted by a Mr. Dormay, the proprietor of a small gas-work at Wandsworth, in the heart of the Wandsworth and Putney Gas Company's district. At these works it seems that some 3 million feet of gas per annum are made, and supplied to 85 consumers by a 4-inch main, extending about 1000 yards. The object of the proprietor was to obtain statutory powers to enter into competition with the company before mentioned; and his case was supported by several witnesses who alleged the superiority of Mr. Dormay's gas, and urged the desirableness of competition. Their assertions and arguments, however, failed to convince the committee, who, without calling on the opponents, declared the preamble not proved. We may mention that the Bill passed the House of Lords after the insertion of clauses which would have brought the undertaking under similar conditions to the companies supplying the City of London, and therefore the Bill was not opposed in the Commons by the Metropolitan Board of Works. The effect of the rejection of the Bill will probably be that Mr. Dormay will have to sell his works, which we believe the Wandsworth and Putney Company are willing to buy at a reasonable price, but not at the fabulous value that has been claimed for them.

A warm discussion took place at a recent meeting of the Whitby Improvement Commissioners, on a resolution for the payment of the charges incurred in opposing the gas Bill promoted by Dr. Atkinson. From the discussion it would appear that none of the commissioners had any doubt about the legality of paying these expenses out of the public funds. Whitby, however, is a borough clearly without surplus funds; and unless Mr. Leeman's Bill should pass, the payment of the £370, which it is estimated the contest will have cost the borough, could, no doubt, be successfully opposed by the ratepayers. It is certainly a question the ratepayers should take up at the present moment, when it is threatened to make the costs of these "unwarrantable "contests" chargeable on borough funds. A decided expression of opinion by a body of ratepayers would be likely to have a strong effect in Parliament.

We give in another column a communicated article on "Legis-"lation in regard to Test-Burners." The question which cropped up, in the discussion on the Dublin Gas Bill, as to the right of a gas company to the use of a burner which will evolve the greatest amount of light as a test-burner, is one of much interest to all gas companies. We have always urged the right of a company to such a burner, premising, of course, that it is one which can be generally employed by the consumer. This, also, is the contention of our correspondent, who argues the case with much ingenuity and skill. But we would add one illustration to the many our correspondent has adduced. The value of a gas depends on the amount of light that can be educed from its combustion, just as the value of an ore depends upon the amount of metal that can be extracted from it. But supposing a process of smelting to be discovered by which, say, 16 per cent. more metal could be extracted from any particular ore that was obtained before, would any one for a moment contend that the value of that ore was not thereby proportionately increased; and if the owners of a mine contracted to supply ore capable of yielding a certain per centage of metal, would they not be allowed to take an improved smelting process into their calculation? As a matter of fact, arguments of the kind we and our correspondent notice are never made use of except against gas companies. There is not a tradesman who raises an outcry against a gas company who would consent to have the value of his goods estimated by a test which he knew depreciated their value 16 or 20 per cent. The case, in fact, requires no argument. Every consumer is at liberty to take advantage of an advertised invention which promises to get 50 per cent. more light from gas than can be obtained by the use of an ordinary burner, and no gas company objects or remonstrates. Surely, then, as a matter of simple equity, a gas company may be conceded the use of the best known burner for estimating the quality of their gas. The article we publish is further of interest, as containing a useful summary of past legislation with regard to test-burners; and, altogether, we are certain that it will be found of great interest to our readers.

We continue to-day our report of the proceedings of the meeting of the British Association of Gas Managers. The details of the proceedings of the committee with regard to the benevolent-fund and Sunday labour questions are of much interest, as revealing the individual opinions and practical experience of many members on these important matters. We may express our regret that the committee did not, as regards the former, see their way to the recommendation of any particular scheme to which, we quite agree with Mr. D. Lane, the companies might reasonably have been asked to subscribe. Still we freely admit that the objections which may be brought against the institution of an ordinary benevolent-fund have great weight, and, on the whole, are inclined to agree with the President and committee that pecuniary assistance should only be given to members under exceptional and peculiar circumstances of misfortune. The Sunday labour question was more fully gone into by the committee, and

the report is, in most respects, eminently satisfactory. It is quite clear that the possibility of dispensing with the labour of making gas on Sunday depends on the possession of ample storeage room, without which all attempts in the direction will be abortive. In the case of the large works at which experiments have been made, ample storeage is provided; but this is seldom the case with country works. Wherever there is sufficient gasholder room, the plan adopted by Messrs. Morton, Woodall, Livesey, and Eldridge may be followed with great satisfaction to the stokers and very little cost to the companies, and the end to be gained is well worth some sacrifice. We hope that all managers who may try the experiment will find the men as appreciative of the benefits as the gentlemen above named. Mr. Warner can hardly be said to have settled the question as to the best form of condenser, but he gave the members some useful information, and provoked an interesting discussion. If any illustration were needed of the advantages of such meetings as that which has just taken place, it would be found in the discussion which ensued on the reading of the paper by Mr. Somerville, "On the Cause and Prevention of choked Ascension-Pipes." An amount of useful practical information was communicated in this paper, and the discussion, which must be fully appreciated by all who listened, or who may read the report which we publish. Mr. Anderson put very well the incontrovertible arguments, we believe, in favour of the use of exhausters, at all events in works of any magnitude. They may be dispensed with in small works, but all experience goes to prove that, however good the results may be without them, they are much improved by the employment of exhausters.

The new Equilibrium Gas-Governor, invented and described by Mr. Charles Hunt, seems to have met with the approval of the members present at the meeting.

Communicated Article.

LEGISLATION IN REGARD TO TEST-BURNERS.

The late proceedings before the House of Commons committee on the Dublin Gas Bill raised a question of great interest in regard to the legislation on Test-Burners. The company were dissatisfied with a Test-Burner that had been used by the corporation, and which, they insisted, was unsuitable for the quality of gas it was applied to, destroying a large per centage of the illuminating power. On this ground they prayed for authority to use a more suitable burner; and their application involved a consideration of the principles which ought to guide legislation in the matter. We have already stated that, in consequence of an amicable arrangement having been come to between the company and the corporation, the opposition to the bill was withdrawn, and the discussion consequently came to an abrupt end long before there had been time to exhaust it, or even to state its main points *in extenso*.

But the question is such an important one, and is so likely to arise again, that we think we shall be doing a service to the gas community in endeavouring to put on record a statement of the arguments and reasonings which appear applicable to the subject, and which we are convinced must have been fully discussed before the committee had the bill proceeded.

We need not now follow the peculiar circumstances of the Dublin case; it will be more useful to examine into the general state of the question regarding the Test-Burner to be used for the statutory determination of the illuminating power of gas.

The question is a complicated and difficult one, involving considerations of a somewhat perplexing character; and the views held upon it, not only by private authorities, but by legislative bodies, have been different, often contradictory. It is, therefore, desirable to examine the various arguments and proceedings bearing on the question, on whichever side they may tell.

It will be in the first place well to get a clear idea of what the question really is.

There are several modes of defining the illuminating power of gas, but it has always been thought desirable, in legislating on the point, to adopt the principle which is most intelligible to the public—namely, to stipulate that a certain quantity of the gas shall produce, by its combustion, a light equal to that of a certain number of candles of a defined standard.

Now, if a given quantity of gas of a given illuminating power produced always the same quantity of light, by whatever means its combustion was effected, this mode of definition would be clear and simple, and nothing more would be needed. But, unfortunately, this is not so; the light may vary enormously, according to the mode of burning, and hence the definition becomes affected largely and materially by the *construction of the burner* employed, and by other circumstances attending the combustion.

How, then, should this point be treated in legislation? What are the rights of a gas company and of the public respectively in the matter?

The answer which appears by common consent to be given to this question is as follows:—The company are evidently entitled to have the benefit of the most perfect method of combustion of the gas that can, in a reasonable, practical, and convenient way, be adopted by the public. If they agree that 5 cubic feet of their gas burned per hour shall give the light of 16 candles, it is held to be unreasonable to compel them to supply gas from which any consumer can, in fair ordinary use, obtain 17 or 18 candles. Such a condition would render the definition a deception and a sham.

It must always be borne in mind that the illuminating power of a certain gas is really a fixed quantity, which not only cannot be exceeded, but, in all probability, can never be perfectly attained. The process of burning is always attended with more or less waste, and all that can be done by improvements in burners is to reduce this waste, and to approximate more closely to the real power which the gas contains. The public have a right to use every reasonable economy in their consumption of gas, and reciprocally the company have also a right to adopt, in the definition of their mutual relations, the most economical kind of burner.

It may be complained, that although the statutory light may be obtained by the best burners used under the favourable conditions, yet the majority of the public will probably use inferior burners, and will, therefore, not get the full stipulated power. This is no doubt true, inasmuch as under the great variety of circumstances under which gaslights are required, it is, in many cases, impossible to secure the full advantage; and the evil is in practice much enhanced by the carelessness or ignorance of the consumers, or the gas-fitters they employ. But the company may reasonably object to be called on to provide for these variations. It would scarcely be practicable to legislate for any average condition; and if it were so, it would be both wrong in principle and inconvenient in practice to put it in the power of the public to get more light from the gas than they had bargained and paid for.

But it must be observed, on the other hand, that in allowing to a company the privilege of maximum economy in the burning, this privilege must be strictly confined to such a mode of consumption as the public can fairly and reasonably take advantage of under their ordinary conditions and requirements.

It would be possible to contrive such a burner, and such a mode of combustion, as would give very high results; but such as would be difficult for the public to use, or inappropriate to their ordinary wants. For example, it has been found that by adopting contrivances to heat the air in its passage to the burner the light is much increased; but such contrivances (at least as hitherto designed) render the apparatus too complicated for ordinary use. Or, again, it might be possible, by burning a very large quantity of gas—say 10 or 15 cubic feet an hour—to show an increased power; but such a quantity would be far beyond any ordinary requirement, and therefore would not be a practical consumption. Hence to adopt such modes of determining the statutory power would be unfair to the public.

From the foregoing considerations it is clear that a gas company may reasonably contend for their right to have the illuminating power of their gas tested by the burner and the rate of burning which will give the *maximum result:* provided always that this burner and this rate of burning shall be such as are *reasonably adapted to the ordinary means and requirements of the consumers.*

Of course, the question will often arise whether this latter condition is satisfactorily complied with; but this, like many other questions, must be left in each special case to some competent authority to decide.

Supposing, now, this principle conceded, it may be well to go a step further and ask the following question:—

In legislating for a new company, and having determined the kind of burner which complies with this condition, is it desirable or proper to *define this burner* in the legislative provision?

There has been a great inclination to do this in gas legislation down to a few years ago, almost all gas Acts passed between 1845 and 1866 having contained some attempt, though generally very imperfect, at defining the burner. But it may be questioned whether it is right to do so either on principle or in practice.

As a matter of principle, it may be urged that it is wrong to define the burner, because to do so directly contravenes the rule hereinbefore laid down, that a gas company is entitled to the best burner. If this rule is sound it must apply not only to the present but to the future, and hence the present definition of the burner would tend to shut the company out from prospective improvements, except by future alterations of the law. No one can say where improvement may stop; we know that we are yet far from having obtained the full amount of light from gas, and improvements will probably still go on, so that what happens to be the best burner now will probably not be the best burner a year or two hence; and then any definition already given, imperfect though it be, will hamper and thwart the company in taking advantage of improvements subsequently made.

Then, as a matter of practice, it is extremely difficult so to define a burner as to fix positively its light-producing value; the circumstances on which its action depends are so minute and delicate, and the principles that affect them are so obscure, that even the maker of a burner cannot positively define the conditions which are absolutely essential to its fully performing its duty, and the vague descriptions which usually get into Acts of Parliament are of no use whatever. Any clever burner-maker may drive a coach and six through them with ease, and it has been repeatedly found, in cases where burners have been authoritatively defined, that by certain alterations their light-giving value may be made to vary very widely, while they still correspond with the parliamentary definition. It is believed that the standard burner defined in the Metropolis Gas Act of 1860 may be so made as, while perfectly corresponding with the definition, to make the same gas appear either of 16 candles or 3 candles, or anything at pleasure between.

The desire, however, to fix a company to a certain illuminating power by defining the burner has been so generally shown in legislation, that it becomes necessary to consider the question—What is

right to be done where a company have been bound by former legislation to a defined burner, supposing subsequent improvements to have brought an improved burner into use, so that the defined burner is no longer the best available? In this case, are the company to remain bound by their old bargain, and to be shut out from the application of the general principle, to which, as we have seen, they may consider themselves entitled?

This is the most difficult aspect of the burner question, and it may be useful to point out what are the arguments which may be used on the side of the company and of the public respectively. The company may plead that the former legislation has become unjust, by depriving them of their right to have the power of their gas measured in the proper way; the public may say, on the other hand, that by adopting the new test the company reduce the illuminating power below the standard they had previously bargained for, and so commit injustice to the consumers in general.

The real question may be most clearly put in this way:

Which party—the company or the public—has, in such a case, the best right to benefit by improvements in burners?

To answer this question it becomes necessary to consider the nature of the contract entered into between the parties. If it were possible to define the constitution of the gas by any chemical standard, independently of the burning, the contract would end at the meter, and the consumer, receiving at that point a certain quantity of gas of the standard agreed upon, would have a right to do with it what he pleased, and to obtain from it as much light as he possibly could by any means in his power.

But this is not the way in which the bargain is made; the contract has reference not only to the quantity of gas, but to the *light it is to produce*—a condition which clearly extends the contract to the burner. The essence of the bargain is that the gas shall furnish a stipulated amount of light, and if any consumer, by taking advantage of improvements in the burner, succeeds in getting from the gas more light than is specified, he does not substantiate his right to that increase of light, he merely proves that the company are giving more than they have bargained for.

In fact it would reasonably seem that the improvement in burners comes in the same category as improvements in any part of the process of gas-making. Suppose an improvement to be made in the mode of carbonization, by which the cost of production were reduced, the public could not claim the benefit of that; it is true it would enable the same light to be afforded at less cost, but the saving would clearly belong to the company.

So with improvements in burners, these also enable the same light to be afforded at less cost, and there appears no valid distinction between the two cases, to prevent the company getting the benefit of this in like manner.

The argument on the part of the public has been put in this way:* "If people go and buy flour, they may make it into bread or puddings, or do what they please with it; and so, if the public buy gas, they may burn it as they please, because they pay for it by meter." But the company may reply, to render the comparison of the flour a fair and analogous one, the condition should be introduced that the flour be charged for according to the *weight of bread that can be made from it*; the baking process would then be analogous to the gas-burner, and if the customer, by any variety in this process, contrived to make more bread, from a given quantity of flour, than was bargained for, he would be committing a fraud upon the seller, just like the consumer who tries to get more than the stipulated light by an improvement in burners.

Another very ingenious and plausible illustration has been given of the argument on behalf of the public. Suppose, it is said, a company stipulated that their gas should contain only 20 grains of sulphur per 1000 feet, and kept to this quantity, as ascertained by the best test then known; and suppose that subsequently, by an improved test, the real quantity in the gas was found to be larger—say 25 or 30 grains—would it be just of the public to insist that the quantity should be reduced? Would not the company naturally wish to be bound by the original, but imperfect mode of estimation?

The error of this argument is, that the cases are not parallel as regards the effect of the new discovery on the public interests. The improvement of the sulphur test would be absolutely without influence on the consumer, who, after the improvement, would be precisely in the same position as he was before; but this is not the case with an improvement in burners. The effect of this must necessarily be at once to give the consumer an advantage; and it is precisely this advantage which gives the company their ground of claim. The essence of their case is that, after the improvement in burners, the consumers are in a position to get more light than, according to the terms of the contract, the company bargained to give them; and no analogous condition to this can be made out in the sulphur case.

If the improved burner were merely a *test-burner*, inapplicable to the public wants, the analogy would be correct, and the argument sound; but (as already remarked) it is an essential condition that the new burner be fitted for public use, and hence the argument fails.

There is one point on which the company and the public must always agree—namely, that the public have an unquestionable right to the full benefit of all improvements in burners, so long as they give a light *not exceeding* the statutory maximum; and it is well known that the greater part—almost the whole—of the consumption of a town is in a state capable of a very large improvement, to which the public are strictly entitled if they choose to adopt it.

The public may call it a hardship that, in the case of a change from an inferior test-burner to a better one, the consumers generally should find their light suddenly lowered. But the hardship is more apparent than real, inasmuch as the consumers have it always in their power, by the adoption of the improved burner, to put themselves in precisely the same position as they were before.

The hardship to the public is more apparent in those cases where the new burner is not applicable; as, for example, suppose the latter to be an Argand, contrived for 5 feet per hour, this would not be available for small lights where a fishtail is used, consuming, say, only 2 or 3 feet per hour. To this the company may answer that the proceeding is only the correction of an injustice previously done to them. They will assert that they contracted to supply, say, 16-candle gas, but by the imperfection of the apparatus for exhibiting its power, they were obliged to supply what proved afterwards to be 18-candle gas, so that the consumers have by this error been hitherto getting more light than they were entitled to. But in fact the progress of improvement will probably extend to burners generally, so that all consumers may secure themselves against loss if they take the proper means.

Much has been said as to the desirability of having a *standard* for the estimation of the illuminating power of gas, and it is perfectly reasonable and just that there should be such a standard. But there has been a strange confusion of ideas in applying this idea of the standard to the *burner*. It is said, for example, that "Parliament should define the burner, as it has already defined the yard measure and the pound weight." This is a great fallacy; the standard for gas illuminating power corresponding to the standard weight and measure is the *candle*, and this should, doubtless, be fixed and invariable. But the *burner* is in no sense the standard, it is only the means by which the gas and the standard are compared together; and it ought to be as perfect as it can be made, in order to do full justice to the comparison.

It would be more correct to compare the burner to the *balance* with which an article is weighed; and no one can doubt the propriety of making this as just and accurate as possible, or of taking the seller advantage of any improvements made from time to time in its construction. Suppose a certain kind of balance, believed at the time to be the most accurate possible, had been stipulated to be used in the sale of an article, and suppose it were afterwards discovered that this were erroneous, and told against the seller, would it not be reasonable that he in such a case should ask for the substitution of the more correct machine?

Having stated the general nature of the question, it is now desirable to inquire how it has been dealt with from time to time.

In the early stages of gas legislation no mention was made of burners, it being, doubtless, supposed that gas of the same power would produce the same light, however consumed. The incorrectness of this opinion, however, came in time to be discovered; and we find, about twenty-five years ago, the burner introduced into legislative consideration. In the Taunton Gas Act of 1845, for example (8 & 9 Vict., c. 67), it is provided that the gas, "when consumed in an Argand burner, at the rate of 5 cubic feet by the hour, shall equal the illuminating power of not less than ten pure spermaceti candles, each consuming 120 grains of spermaceti by the hour."

Now there can be no doubt as to the object of this provision. Many kinds of burners were in use, but it was found that they gave different results with the same power and quantity of gas; and the Legislature determined to protect the company by giving them what was known to be the most favourable burner for evolving the light—namely, the Argand. Unquestionably, therefore, at this early period the principle hereinbefore mentioned was conceded and adopted by the Legislature.

In the Gas Clauses Act of 1847 no reference was made to illuminating power.

Some years later it was found that, even with the Argand burner, the light might be made to vary, according to the size of the burner and the chimney attached thereto. Hence, still with the object of doing full justice to the companies gas, it was determined to specify it with somewhat more exactness. The burner found to answer best was a certain size; and as it was customary in those days to describe the various sizes of Argand burners by the number of holes they contained, the description was introduced, that the test-burner should be an Argand, with 15 holes and a 7-inch chimney, and this description prevailed in many later Acts of Parliament on gas matters.

When the bill was brought in for the regulation of the metropolis gas, in 1860, the subject of burners was discussed at some length before the Commons committee. The companies appear to have arrived at a suspicion that the construction of the burner might have an important influence on the apparent illuminating power of their gas, and they made a great effort to have the words, "or other suitable burner," inserted after the description of the Argand previously mentioned—their object being to take advantage of any future improvements that might be made.

As far as the sense of the committee can be gathered from the printed accounts of their discussions, it would appear that they were perfectly willing to grant the companies the use of the best possible burner that could be brought forward *at that time*; and they thus conceded the principle that the companies were entitled to the most favourable test for their gas; but the committee declined to leave the question open for the future, and, as the companies were not prepared to suggest any better burner than the ordinary Argand, with 15 holes and a 7-inch chimney, this was named in the Act in accordance with precedents established in former years.

The subject of burners was again warmly discussed on the Birmingham and Staffordshire Gas Bill, in 1864, afterwards passed as 27 & 28 Vict., c. 239, and the Lords committee not only defined the burner with greater exactness than before, but stipulated that a pattern

* See proceedings before House of Commons committee in 1866, Q. 2258.

should be prepared for future identification. The following is the provision (sec. 34):—

"All the gas supplied by the company shall be of such illuminating power as to produce, at a distance of not less than 1000 yards from the works—from a metal Argand burner having an external diameter of 1·10 of an inch, and an internal diameter of 0·50 of an inch, and having 15 holes, each hole of the diameter of 0·05 of an inch, and with a 7-inch chimney, supported upon an ordinary gallery without a perforated disc, and consuming 5 cubic feet of gas per hour—a light equal in intensity to the light produced by 14 uncased sperm candles of six to the pound, each burning 120 grains an hour; such burner being similar in every respect to the model deposited with the town-clerk of the borough of Birmingham, the clerk of the peace of the same borough, and the secretary of the company."

There was a proviso that the company and the Town Council might agree upon any other mode of testing, but this could hardly be expected to give the company the right to test by an improved burner.

From the foregoing statements it will be seen that the tendency of legislation up to that date had been to define the burners, the definition becoming more complete and strict from time to time; but a year or two later the legislative practice took a sudden change.

In 1866 a committee of the House of Commons undertook an investigation as to the working of the Metropolis Gas Act of 1860, the inquiry being prolonged over the sessions of 1867 and 1868.

By this time it had become evident that any attempt to ensure finality in the matter of gas-burners was impracticable. Between the London Act of 1860 and the Birmingham Act of 1864 considerable improvements had been made, and these improvements had now been continued so far that the old burner had ceased to be any fair test of the illuminating power.

The nature of the variation between different burners was fully explained to the committee by many witnesses, and it was shown that new Argand burners had been produced which did more justice to the illuminating power of the gas—to the extent of 1 or 2 candles—than that in use when the Act of 1860 was passed. The companies having to provide the burner, naturally desired to use this improved form, and their right to do so was urged upon the committee.

Dr. Letheby, for example, although he appeared against the gas companies, said (1866. Q. 1051):—

"I see no reason why the companies should not find, if they like, the meter and burner. The gas companies are surely entitled to that burner which will give them the best light."

(QQ. 1301—1304.) "The companies have the power of providing the burner. I do not think the Legislature contemplated any particular kind of burner."

(QQ. 1547 and 8.) Do you think it fair, or do you not, that the testing-burner should be the burner which gives the best character to the gas?—Undoubtedly.

You would not recommend that an inferior burner should be used because it was in operation a certain definite time ago?—No. I recommend the best burner that is known for the production of the most light from gas, because burners do not make light; they simply educe it. It is not fair to use a burner that is leaky.

Dr. Aldis, gas examiner for St. George's, Hanover Square, also called against the companies, says (QQ. 1677 and 8):—

"I think the company has a right to do the best for its own gas, and the public can avail themselves of a new burner if they please: they may adopt the same plan as that adopted by the companies. I think the consumer might use the same burner under all circumstances."

Mr. G. W. Stevenson, also appearing against the gas companies, said (Q. 4258):—

"I think the companies ought to have the best burners they can get, because you cannot increase the illuminating power of gas; the gas has its illuminating power in itself inherently, and you may destroy it by a bad burner, but you cannot increase it by a good one."

The result of the three years inquiry was the City of London Gas Act of 1868. In this it was provided that a body of three persons, to be called the "Gas Referees," should be appointed, with power to determine, from time to time, various matters connected with the supply of gas to London, and the question of the test-burner was referred to them in the following terms (section 43):—

"The gas referees shall prescribe the burner for testing the illuminating power of the gas, and it shall be such as shall be the most suitable for obtaining from the gas the greatest amount of light, and be practicable for use by consumers."

Here it will be seen that, after the most careful and deliberate investigation, protracted over three years, the proposition laid down in the early part of this paper have been clearly and definitely affirmed by Parliament, and have become established principles in gas legislation.

Parliamentary Intelligence.

HOUSE OF LORDS.

Monday, June 19, 1871.

The Northampton Improvement Bill.—The opposition was withdrawn, and the Bill committed.

The Musselburgh and Dalkeith Water Bill was reported, with amendments.

The Gas-Works Clauses Act (1847) Amendment (No. 2) Bill.—Amendments were made.

The Richmond Sewage Bill was referred to a Select Committee, consisting of Lord Egerton (chairman), Earl Amherst, Lord Dacre, Lord Gwydir, and Lord Buckhurst, who will meet on Wednesday, June 21, at eleven o'clock.

Petitions were deposited against the Richmond Sewage Bill, from the Thames Purification Company, Grand Junction Water-Works Company, and Southwark and Vauxhall Water Company.

Tuesday, June 20.

The Kidsgrove Gas; Southport Improvement; and Salford Borough Drainage Bills, were reported, with amendments.

The Lambeth Water Bill was reported, without amendment.

The Kilmarnock Municipal Extension and Improvement Bill.—The Commons amendments considered, and agreed to.

The Arbroath Corporation Gas Bill, and the Bradford Corporation Gas and Improvement Bill, were read a third time, with the amendments, passed, and sent to the Commons.

The Newry Borough Improvement and Water Supply Bill was brought from the Commons, and read a first time.

The Gaslight and Coke Company; the Perth Gas; and the Sheppy Gas Bills, were returned from the Commons, with the amendments agreed to.

The Edinburgh and District Water Bill was referred to a Select Committee, consisting of Lord Wharncliffe (chairman), Earl Morton, Lord Elliot, Lord Northwick, and Lord Churston, who will set on Thursday, June 22, at eleven o'clock.

Gas-Works Clauses Act (1847) Amendment (No. 2) Bill.—Amendments reported, and a further amendment made.

Thursday, June 22.

Gas and Water Provisional Orders Confirmation Bill.—The opposition was withdrawn, and the Bill committed.

The Richmond Sewage Bill was reported from the Select Committee, with amendments.

The Gas-Works Clauses Act (1847) Amendment (No. 2) Bill was read a third time, amendments made, Bill passed, and sent to the Commons.

Friday, June 23.

The Lambeth Water Bill was read a third time, and passed.

The Dundee Water; Salford Borough Drainage and Improvement; Forfar Gas; and Kidsgrove Gas Bills, were read a third time, with the amendments, passed, and sent to the Commons.

The Alliance and Dublin Consumers Gas Bill was brought from the Commons, and read a first time.

The Cleveland Water Bill was returned from the Commons agreed to, with amendments.

Monday, June 26.

The Cleveland Water Bill.—The Commons amendments were considered, and agreed to.

The Cefn Acreeair and Rhosymedre Water Bill was read a third time, with the amendments, passed, and sent to the Commons.

The Aberdeen Municipality Extension Bill was reported, with amendments.

A petition was deposited against the Edinburgh and District Water Bill, from the inhabitants of Edinburgh, &c.

Tuesday, June 27.

The Burnley Borough Improvement, and Northampton Improvement Bills, were reported, with amendments.

The Richmond Sewage Bill was read a third time, with the amendments, passed, and sent to the Commons.

The Abergavenny Improvement (No. 2); Arbroath Corporation Gas; and Bradford Corporation Gas and Improvement Bills, were returned from the Commons, with the amendments agreed to.

Petitions were deposited against the Newry Borough Improvement and Water Supply Bill, from owners, &c., of property, and others, of Newry; inhabitants of Camwregh, &c.; James Savage; and Newry Town Improvement Commissioners.

Thursday, June 29.

The following Bills received the Royal Assent:—The Manchester Improvement; Chorley Improvement; Kilmarnock Municipal Extension and Improvement; Gaslight and Coke Company; Perth Gas; Sheppy Gas; Lambeth Water; Cleveland Water; Abergavenny Improvement (No. 2); Arbroath Corporation Gas; and Bradford Corporation Gas and Improvement.

The Liverpool Improvement and Water Bill was referred to a Select Committee, consisting of Lord Methuen (chairman), Viscount Hutchinson, Lord Leigh, Lord Lurgan, and Lord Acton.

Friday, June 30.

The Southport Improvement Bill was read a third time, with amendments; further amendments made, the Bill passed, and sent to the Commons.

The Dublin Main Drainage Bill was read a third time, with the amendments, passed, and sent to the Commons.

The Chesterfield Water and Gas Bill, and the South Lancashire Water Bill, were returned from the Commons agreed to, with amendments.

The Ince Water Bill was returned from the Commons agreed to, with amendments; the said amendments considered, and agreed to.

The Forfar Gas; Kidsgrove Gas; Dundee Water; and Salford Borough Drainage and Improvement Bills, were returned from the Commons, with the amendments agreed to.

Petitions were deposited against alteration in the Alliance and Dublin Consumers Gas Bill, from the Corporation of Dublin;—and against alteration in the Liverpool Improvement and Water Bill, from the Lancashire and Yorkshire Railway Company.

HOUSE OF COMMONS.

Monday, June 19, 1871.

A petition was presented against the Metropolis Water (No. 2) Bill, from the Sheriffs of London.

Perth Gas Bill.—The Lords amendments were agreed to.

The Cleveland Water Bill, as amended, was considered.

The Wandsworth Gas Bill was reported, "Preamble not proved."

A petition was presented against the Metropolis Water (No. 2) Bill, from the Kent Water-Works Company.

The Sewage Utilization Bill was considered in committee, and reported.

Tuesday, June 20.

The Waterford Water Bill, as amended, was considered.

The Ince Water; the Chesterfield Water and Gas; and the South Lancashire Water Bills, were reported, with amendments.

Wednesday, June 21.

The Alliance and Dublin Consumers Gas Bill, as amended, was considered.

Thursday, June 22.

The Cleveland Water Bill was read a third time, and passed, with amendments.

The Alliance and Dublin Consumers Gas Bill was read a third time, and passed.

A petition was presented against the Metropolis Water (No. 2), Bill, from the Metropolitan Water Supply Association.

MONDAY, JUNE 26.

The Abergavenny Improvement (No. 2); Arbroath Corporation Gas; and Bradford Corporation Gas and Improvement Bills.—The Lords amendments were agreed to.

The Chesterfield Water and Gas; Ince Water; and South Lancashire Water Bills, as amended, were considered.

The Lincoln Water Bill was read a second time, and committed.

TUESDAY, JUNE 27.

The Dorking Gas, and the Todmorden Gas Bills, were reported, with amendments.

A petition was presented against the Metropolis Water (No. 2) Bill, from the Vestry of Richmond.

THURSDAY, JUNE 29.

The Forfar Gas; the Kidsgrove Gas; the Dundee Water; and the Salford Borough Drainage and Improvement Bills.—The Lords amendments were agreed to.

The Chesterfield Water; Ince Water; and South Lancashire Water Bills, were read a third time, and passed, with amendments.

FRIDAY, JUNE 30.

The Cefn Acrefair and Rhosymedre Water Bill.—The Lords amendments agreed to.

MUNICIPAL CORPORATIONS (BOROUGH FUNDS) BILL.

Mr. Leeman, in moving the second reading of this Bill, stated that it was intended to prevent Municipal Corporations and Local Boards of Health from being crippled in the discharge of the duties with which they were entrusted, in consequence of a recent decision in the Court of Queen's Bench.

Lord Crichton moved the adjournment of the debate.

After some conversation,

Mr. Hardy opposed the provisions of the Bill, but would assent to its second reading on condition that it was referred to a Select Committee.

Mr. Leeman acceded to this suggestion, and Lord Crichton's motion having been withdrawn, the Bill was read the second time, and referred to a Select Committee.

HOUSE OF COMMONS.

(*Before Sir* Philip Egerton, *Chairman; Mr.* Power, *Mr.* Fagan, *and Mr.* Foljambe. *Mr.* Bonham-Carter *sat as Referee.*)

WANDSWORTH GAS BILL.

THURSDAY, JUNE 15.

Mr. Denison, Q.C., and Mr. Wilkinson appeared in support of the bill; and Mr. Richards, Q.C., and Mr. Gore for the Wandsworth and Putney Gaslight and Coke Company, petitioners against the same.

Mr. Wilkinson, in opening the case, said the object of the bill was to enable Mr. Dormay, the proprietor of an existing gas-work in the parish of Wandsworth to extend the supply, and put himself under the protection of an Act of Parliament. There was also a company called the Wandsworth and Putney Gaslight and Coke Company, situate at that place, which supplied a portion of the parish, without having an Act of Incorporation. The very foundation of Mr. Dormay's enterprise originated from the fact of the company's inability to supply him with gas. He started his works in 1847, and since that date up to the present time that gentleman had continued to manufacture and supply gas; and that gas, which he had originally designed only for himself, he had, by the urgent request of his neighbours, extended and amplified for their accommodation. Mr. Dormay's works were in existence some nine years before the Wandsworth Gas Company started, and therefore he could not be placed in the position of a new competitor. All his client wanted was the protection of an Act of Parliament so as to prevent being crushed by his more powerful neighbour. He should, therefore, show that he had strong evidence in his favour as a private adventurer; and also that great dissatisfaction was felt by some of the inhabitants with reference to the gas supplied by the company. To such an extent did that dissatisfaction exist, that the local board was petitioned by 400 of the inhabitants to establish another company. The land on which his client's works were erected was his freehold, and to this there was a water frontage of considerable value to him as a gas manufacturer. The district itself was large, and still increasing, and there was ample scope for both companies. Therefore the granting of the powers sought for by Mr. Dormay would not have the effect of competition, but it would have the effect of not allowing him to be oppressed, and would give at the same time a healthy state of things, which the inhabitants had long looked for. He contended that the inhabitants had a right to ask for that privilege which had already been extended to the metropolis. He thought the gas company had interposed very serious obstacles to Mr. Dormay extending his mains in the streets, even to the extent of preferring a bill of indictment against him. The Wandsworth Gas Company supplied a light inferior to Mr. Dormay's, and was but 14 sperm candles, at the price of 4s. 3d., after the deduction of discount. Mr. Wilkinson then cited, in support of his case, that of the Windsor Water Company and the Duke of Sutherland's Railway, and contended that those two instances showed clearly that his application was not entirely without precedent. The bill came to the committee with the sanction of the House of Lords, and there were not any difficulties in the way in the shape of engineering. It was a bill brought by an individual in self-defence as a manufacturer, in order to be allowed to accommodate himself and neighbours with gas, and he now asked the committee to confirm that which the House of Lords had already done. He asked it as a matter of justice; and, moreover, it would be far better in a district like Wandsworth that a private individual should be restrained by Act of Parliament than be allowed to remain with such roving powers as Mr. Dormay would have if his application should not be allowed.

Mr. *John Dormay*, examined by Mr. Wilkinson, said he had resided at Wandsworth all his life, and was a freeholder. He commenced making gas in 1847. The company refused to lay down the gas unless he first laid down the pipes. He applied to the company previous to 1847, and at that time the supply-mains were as near to him as 70 or 80 yards. He made the application in the names of Mr. Wentworth, engineer, and himself. He believed he was at one time a shareholder in the company. He then supplied himself with gas, and at that time the company charged 9s. 6d. per 1000 feet. He charged the same price himself. The company then reduced the price of their gas, and he did the same. The company allowed a rebate of 3d., and he (witness) intended charging 4s. He supplied 85 people, many of whom were large consumers, some having two meters. He had several applications from others, whom he could not supply, because he was afraid to open the ground on account of the obstacles put in his way by the company. The company indicted him. Mr. Wilson called upon him, and told him that his gas was escaping. He thanked him, and sent men to open the ground. The company indicted him on the 17th of February, 1862, but he knew nothing of it till it was all over. A gentleman told him that the grand jury had thrown out the bill, and he went to inquire the next day as to the statement, and found it to be correct. He suffered from escape of gas, by being compelled to put on more pressure. He was obliged to keep all his retorts at work in the winter, which resulted in a serious loss to him. He supplied five public lamps, at £3 10s., but he did not know what the company charged. He also supplied the church. The consumption of coal was between 500 and 600 tons in the year. He had ample means of improving his works without inconvenience to any one. His price for prompt payment at present was 4s. 6d. per 1000 feet. Messrs. Watney, distillers, and Messrs. M'Murray, paper manufacturers, had also private works. He had no intention of selling his works, and was ready to pledge himself to the terms of the Act. A Mr. George had left him to go to the company. The income for coke and gas was between £900 and £1000 per year. Mr. Wentworth had his gas from the company, because he said if he did not he should lose their work; but he supplied his house. He took the gas off Mr. Wentworth's factory on the 24th of June, 1865.

By Mr. Richards: He did not know that in 1847 the company was incorporated. He was one of the directors of the joint-stock company when he applied to have the gas laid on. Their message to him was that if he wanted the gas he must lay his own pipe down. He never saw the minute produced before which stated that it was agreed that he should pay a portion of the expenses. He denied the statement. He cleared off the books of the company because he did not like their proceedings. He sought to obtain an Act of Incorporation for himself, his heirs, and assigns. He had heard of Mr. Cutler supplying Windsor with water, and he did not know that Mr. Cutler was bound to sell to the local board in a certain time. He had been opposed in the Lords, and the Metropolitan Board did succeed in extracting 16 candles illuminating power at 4s. per 1000 feet. As regarded the freehold property, he was desirous of selling that on account of the gas company being disagreeable. He was not anxious to sell the gas-works. The wharf frontage and gas-works were offered for sale, but £15,000 was not asked. He had not, however, mentioned a price. He had books showing the investments he had made in his gas-works.

Witness (to the chairman): I do not come here to sell my works. I simply ask you to allow me to open the ground to increase the supply.

By Mr. Richards: No mention of capital was made. He was not aware that any dividend of 10 per cent. was mentioned. He did not know what his solicitor had done. Did not know how many lamps the company lighted. In 1855 Wandsworth was a large place, and the population had increased immensely. The size of his mains was 4 inches, and extended 1000 yards. That coloured green (dark) on the map was the scheduled property, but that marked light green was not. Mr. Carter had the property for sale, but he never told him what were his profits. The profits were about £350 per year. Such as balance of tar, &c., which went into his pocket, was not accounted for. If the *plus*, such as gas used and wasted, was added, it would increase the profits £150 more. That would be £500. He was his own collector, director, and chairman, and therefore he had none to find fault with. He had not a chairman to pay.

Mr. Richards: But you have to pay counsel now.

Cross-examination continued: He declined, under the circumstances, to produce his books. There was a petition in favour of his bill. Mr. Keighley, his solicitor, got that up. Mr. Stoucheur, Mr. Foster, and another person went round for signatures. It was signed by Battersea and Putney people as well as Wandsworth. He did not know how he had accommodated the gas company. The Phœnix Gas Company light some part of Battersea, and the Brentford Company some portion of Putney. He supposed they joined in the bill.

By Mr. Denison: The company gave 14-candle gas at 4s. 3d. The Metropolitan Board induced him to give 16-candle gas at 4s., and that he thought was rather hard. He never heard of the local or the Metropolitan Board wishing to buy his works. His customers came voluntarily.

Rev. *John Buckmaster*, examined by Mr. Wilkinson, said he was vicar of All Saints Old Church, Wandsworth. His church had been lighted by Mr. Dormay efficiently in every respect for some six years. The gas at his house, supplied by the Wandsworth Gas Company, was very indifferent. His family were compelled to have auxiliary aid from lamps. He thought the competition would be very desirable. Previous to Christmas he could not read by the gas very well, but it had been better since.

By Mr. Richards: He read his sermons, but it was different gas in the church to that laid on at his house.

Mr. *Nathaniel Ayling*, shoemaker, examined by Mr. Wilkinson, said he had lived in Wandsworth for 35 years, and was supplied with gas by the company, and had complained of its impurity and inadequate supply. The complaint was not attended to, and he then had gas from Mr. Dormay. The bills of the gas company were continually rising, though the illuminating power did not. The burners were continually being repaired.

By Mr. Richards: Most people, he thought, considered competition in gas a good thing. He did not know that the Phœnix Gas Company had a district assigned to it near Wandsworth where no competition existed. Competition was very different in the shoe trade. There was a difference between a lively competition and a ruinous competition.

Mr. Richards: And so you left the lively competition, and come to a ruinous competition?

Witness continued: The complaints which were made were nothing unusual, but he could not give the dates. His shop was about a mile from the offices of the gas-works. It was ten minutes walk.

By Mr. Denison: It was so bad that he had to get better gas. He had heard the company's gas was now better.

Mr. *James Speed*, examined by Mr. Wilkinson, said that he was a butcher, residing at 105, High Street, Wandsworth, and had carried on business there for 14 years. He was supplied by the Wandsworth Gas Company, and was not satisfied with the supply. He had complained to Mr. Wilson, one of the officers of the company, but ineffectually. He then went to Mr. Dormay for a supply. He had been obliged to burn candles when he had the company's gas. He had considerable difficulty to induce Mr. Dormay to supply him, because he was afraid, at first, he should not be able to do so. The gas-rental was cheaper than that of the company. He thought Mr. Dormay's bill desirable.

By Mr. Richards: There had not been any disagreements with the gas company, but the company had threatened to cut off his gas, and they did so. He was not unwilling to pay, but they did not come for it. They had made 22 applications before the company threatened to cut his gas off. He did not know that they had ever said he was bad pay, because the money was always ready for them. He had many times complained to Mr. Wilson about the gas.

By Mr. Denison: He had made up his mind to leave the company before they threatened to cut off the gas.

Mr. *George Pimm*, examined by Mr. Wilkinson, stated that he was manager of the Aërated Bread Works, South Street, Wandsworth. He generally paid £100 to £110 per year for gas to the Wandsworth Gas Company. Latterly the supply had been better, but at times it was still very scanty. He had complained personally, and by letter on two occasions. Originally, he supplied his own meter. The company's inspector induced him to allow the company to supply their meter, but the supply was as bad as with his own meter. The supply was so bad at times that he had to send for one of the officers to his house at eleven o'clock one night. The difficulty he experienced was that if he went to bed before twelve o'clock at night, leaving the gas-burner turned to a certain limit, it invariably went out; but after twelve o'clock he could regulate the gas himself. He had been very much disturbed by naphthaline, but that had been remedied. The company's gas was so bad once that he and friends could not see one another.

By Mr. Richards: Had been supplied with gas by Mr. Dormay for five or six

years. He had heard that the Wandsworth Company suffered very much from naphthaline; but he believed all gas companies did more or less.

Mr. RICHARDS: How often have you and your friends lost sight of one another? I suppose you do not see double with Mr. Dormay's gas?

Witness: Several times.

Mr. *W. Leech*, grocer, in partnership with his brother at 49 and 51, High Street, Wandsworth, said Mr. Dormay's gas was laid on at 49, High Street, and the company's gas at No. 51. Although there was a nominal difference in the company's gas of 3d. per 1000 feet, he considered that Mr. Dormay's gas was cheaper. He had made complaints about the company's gas, but he believed that, since the present agitation, the company's gas had improved, but still it was deficient in the daytime. It inconvenienced him, because he could not bottle off the wine in the cellar by the gas alone.

By Mr. RICHARDS: It seemed to him that the very mention of competition had had a very good effect. Two companies in Wandsworth would benefit the public. Had heard that each London company had a monopoly over the district which it lighted. He had never written to the company complaining of the gas.

By Mr. WILKINSON: At first Mr. Dormay said his pipes were scarcely large enough, but he had since altered them. He knew the feeling of the gentry, and they stated that another company would put the present company on their mettle.

Mr. *G. Clifton*, examined by Mr. WILKINSON, said he was a draper, of 7, Bank Buildings, High Street, Wandsworth, and had been supplied by the company for five years. He had two shops, and had 20 burners in one shop, supplied with the company's gas, for four years. He could not get sufficient light, and had complained. He believed it would be convenient to Wandsworth if the application of Mr. Dormay was granted.

Mr. *Alfred Penny*, examined by Mr. WILKINSON.

He was a gas engineer, and had had great experience in the management of gas-works. Mr. Dormay's works were situated on a creek running out of the Thames, so that he had the full advantage of the river to bring his coals up; and they passed from the river close alongside the premises where he manufactured his gas, so that there could not be imagined a position more suitable and more convenient for the making of gas. The site of the works was also in the heart of Wandsworth, and had also the advantage of being close to a place where the coke and other articles manufactured out of coal could be disposed of advantageously. There was plenty of area to enable him to make larger works than at present existed, and there would be no difficulty in erecting a gasholder for storeage purposes. There was no doubt what Mr. Dormay would do if he had the authority of Parliament to construct the works. It had occurred to him that it would be more advantageous both to the existing company, and better in the public interests, if Mr. Dormay had a certain portion of Wandsworth given to him to supply, he should not be thrown into competition all over the district. That was the opinion he (witness) gave before the committee of the House of Lords. There was no difficulty in doing that. To witness's knowledge, the manufacturing works of the Wandsworth Gas Company were situated on a very small spot, very little larger, if any, than the site of Mr. Dormay's works, and they have been obliged, as the consumption increased, to go on pulling down, re-erecting, and destroying works that were not worn out, simply to enable them to erect larger ones, in order to supply the district. In point of fact, the ground on which they made gas was very little larger than that which Mr. Dormay had scheduled in his bill. The gas company had wasted capital, as every other gas company had. He believed Mr. Dormay had done the same. He told witness he had spent £6000 or £7000, and it was possible he might have done so, although there was nothing to show for it. The want of storeage appeared to be the greatest want, but the works wanted restoring altogether. Mr. Dormay had felt, he believed, that it would be unwise to make any expenditure unless he got some parliamentary protection; and it was notorious that a person could not safely do so without. No doubt the public would be protected, and be gainers by the bill. Witness was afraid that if the result was unfavourable to Mr. Dormay before that committee, his property would no longer be of any value to him. Mr. Dormay would erect larger works, but he would not require capital to light the whole of the district, as the company would still have the lion's share. He should say from £10,000 to £15,000 would suffice to begin with. The maximum price being 4s.—6d. less than the maximum price of the old company—of course the public would be the gainers, and that would be in addition to the advantage of having a higher illuminating power. The inhabitants, as regarded competition of that character, had answered the question themselves, and they all would think so, he should imagine, if they were to have 16-candle gas and pay 4s., instead of having 14-candle gas and paying 4s. 6d. He believed that there was a difference between the existing Wandsworth and the Putney Gas Company's works, and Mr. Dormay's. The works stood at the disadvantage of having to pass through a lock, and to pay a small toll, while Mr. Dormay's barges came direct alongside his wharf, and he was, therefore, in a better position than the company.

FRIDAY, JUNE 16.

Mr. *Alfred Penny*, cross-examined by Mr. RICHARDS.

Mr. Dormay's works were very small; they would turn out between 3 and 4 million, perhaps 5 million, cubic feet of gas per annum. He would be able to supply a great number of the inhabitants. As a practical engineer, he would say that Mr. Dormay's works might work up, and he would, no doubt, increase his works. If he yielded to the solicitations of the inhabitants to supply them, he would either supplement his main or put down a larger one.

By Mr. WILKINSON: The mode in which Mr. Dormay may deal with his works had not particularly engaged his attention. With regard to competition, a well-regulated monopoly was the best form in which such matters could be understood. It was a wholesome thing for companies to be so exposed at times. Mr. Dormay deserved well of the public, because he had supplied them with light when the company did not do so. It would, therefore, be hard if powers were not granted to him. As to the Bridgend case, the application was not made by the owner, but by the company, who were hostile to him. In the course of those proceedings, the chairman (the Marquis of Sligo) said he would not allow the interest of the existing works to be extinguished. The private works were then bought up, in accordance with a clause in the Act, and they became the property of the local board. It was thought that 16 candles illuminating power, and the low price of 4s., would be a sufficient protection for the public and the Local Board of Works.

Mr. *Alfred Brown*, examined by Mr. WILKINSON.

Was a surgeon at Wandsworth. Had been there 20 years, and was a member of the Local Board of Works. His house was supplied by the company, and his surgery by Mr. Dormay. He wished he could get Mr. Dormay's supply at his house. The company's gas was nothing in comparison with Mr. Dormay's. The company's gas had gone out in the night, and filled the house with gas, and was a very great nuisance. Formerly he had made complaints to the company's inspector. He thought they got a much better light from Mr. Dormay, and that the gas was much cheaper in consequence. Lately he had not suffered inconvenience from the company's supply, but, since the matter of a new company had been agitated, the gas had considerably improved. Some time ago he attempted to vaccinate a patient at his house, but the gas was so bad that he was obliged to ask the patient to go to his surgery. The local board, of which he was a member, had never had any complaints regarding Mr. Dormay's gas, but the board had received complaints about the company's gas. A complaint from the board would only be as regarded the public lamps. The public lights were bad, and he had frequently seen them out.

By Mr. RICHARDS: The local board merely opposed for the insertion of clauses. He believed they would be glad if Mr. Dormay did supply the district. There was a petition by the board against the bill. The local board knew nothing about the matter, and would not be responsible for his (the witness's) statements before the House of Lords. He recollected walking with Mr. Kimber before the investigation of the quality of the gas. His opinion was that Mr. Dormay's gas would be a boon to the district. He thought competition a wholesome thing for Wandsworth, as the company had shown they could supply better gas if they liked; but they would not. The letter read by counsel from the company, stating that their testing apparatus was of the most perfect manufacture, was not read to the local board. The letter of the 17th of November, written to the company by the clerk of the local board, complained of the gas; and the answer of the 3rd of December, in which the company said the public lights would be inspected, was thought satisfactory by the local board, and that the company would do what was right. He did not know that there were, or were not, five consumers of gas on the local board. He should think not, because the majority of the members came from a district where the gas was not laid on. He did not know whether the local board opposed the company's bill in 1866. He knew now that five consumers could have the gas tested at any time. He did not know it before. The local board had no power to do so. Mr. J. Langton, a member of the local board, said that Mr. Dormay's gas was good, and he wondered how such an allegation that it was bad had got into the petition. Mr. Langton, too, was a shareholder in the company.

Dr. *Longstaff*, examined by Mr. WILKINSON, said he resided at Wandsworth, at South Fields. He had retired from practice many years. He was supplied with gas by the company. It was inferior in quality and quantity. Sometimes it approached the quality of good gas. In consequence of the badness of the gas he was obliged to have a lamp constantly kept in the dining-room to supplement the gas; but during last winter he was obliged to have the lamp five or six nights in the week, and he had a 3-light gaselier. That had been the case for years. He had been from home, and since his return he observed the light was better. One inconvenience was owing to the supply-pipe being choked up with naphthaline.

By Mr. RICHARDS: He thought it would be exceedingly beneficial to the neighbourhood to be supplied with Mr. Dormay's gas. The population was increasing, and he thought there was plenty of room for competition. He agreed with competition in all things.

Mr. RICHARDS: But you have retired from business, you know.

Witness continued: He had a house at Hull fitted with the same kind of gaselier and burners, and he could see to read well by that. He simply contrasted the difference to the gas at Wandsworth.

Re-examined by Mr. WILKINSON: On Saturday night, owing to the increased consumption, it was impossible to read by the light given; but the great difficulty he experienced was from naphthaline. His wife also suffered from the bad supply of gas, although her sight was good.

Mr. *Gentry Dennis*, draper, 90, High Street, Wandsworth, examined by Mr. WILKINSON, had carried on business at that place for 14 years. He was supplied at his establishment by the company and Mr. Dormay. The supply of the company was then good, but during last winter it was inferior. He had made verbal complaints to the inspector, and he thought he had written once to the company. They had attended to his complaint, and he had nothing in that respect to complain of. He thought it would be desirable if Mr. Dormay was allowed to extend his works.

Mr. *James Tracy*, draper, High Street, Wandsworth, examined by Mr. WILKINSON: For the last 20 years he had burned Mr. Dormay's gas. He left the company because Mr. Dormay's gas was better. He knew the feeling was in favour of Mr. Dormay's gas.

By Mr. RICHARDS: He belived in good, wholesome competition. He thought two companies would be sufficient.

Mr. *Selwood*, grocer, and pork and poultry dealer, High Street, Wandsworth, had resided at that place. No. 52 was supplied by Mr. Dormay, and No. 54 by the company. He wished Mr. Dormay to supply the latter shop, but he had not the power to break up the road. He had had the company's gas go out entirely. As a member of the local board, he could say that the board had made complaints to the company.

Mr. *William Foden*, grocer, High Street, Wandsworth, said he was supplied with gas by the company, and the light was certainly not that which he paid for. He had complained verbally and by letter. The letter was acknowledged, and the company sent a man down to look to the meter, but he did not receive any benefit from it. He believed that Mr. Dormay could not supply him, or he should have availed himself of having it. He believed the gas of Mr. Dormay at 5s. would be cheaper than the company's at 4s. 6d.

Mr. *Edward Stokes*, bootmaker, 122, High Street, examined by Mr. WILKINSON, said he was a member of the local board. He changed to Mr. Dormay, and was satisfied with his gas. He understood that the local board would oppose unless certain clauses were introduced into the bill. The board had not complained of Mr. Dormay's gas, but they had of the company's. He believed competition would be good, so far as two companies were concerned.

Mr. *Thomas William Langley*, of the King's Arms Tavern, Wandsworth, examined by Mr. WILKINSON, said he had always been supplied by Mr. Dormay, and had always had plenty of pressure as regarded the gas. He had heard Mr. Dormay's gas spoken well of, and complaints against the company. The feeling of the inhabitants was that it would be a good thing if Mr. Dormay obtained his bill.

Mr. *George Morgan*, cooper, examined by Mr. WILKINSON, said that he had the company's gas at his works, and Mr. Dormay's in the High Street. When he applied to the company to lay on the gas they refused to do so, unless he provided his own pipes. He did so, and then they required 30s. before they would commence, which they said would be kept as a deposit as long as he burned the gas.

Mr. *James Hawkins* was employed as collector for the company, and left in consequence of failing health. He collected for Wandsworth, Putney, and part of Battersea. He attended that day unwillingly and by compulsion. He had received many complaints, and had told the parties that the board had a law that all complaints should be made officially by letter. He had stated that he had received complaints as to the quality of the gas. The inhabitants state, seeing the difference between Mr. Dormay's gas and the company's, that they would rather have Mr. Dormay's gas if they could. There had been a complaint from the Wandsworth Lunatic Asylum, and the company laid down an extra main.

By Mr. RICHARDS: It was nothing but right that parties complaining should write. As regarded the asylum, the company could do no more. He came as a witness by compulsion, and by the letter produced. [The letter was shown, and proved to be a request from the solicitor to Mr. Dormay.] He did not know the party who signed the letter. That was what he called compulsion.

Mr. RICHARDS: And that is what you call compulsion. Do you mean to say that if you had received a letter signed by any other name you would have attended?

Witness replied in the affirmative.

Mr. RICHARDS: Then I should think you are a very humble, simple-minded man.

This was the case for the promoters, and the room was cleared. After a short deliberation, the public were readmitted, when

The CHAIRMAN said the committee were of opinion that the preamble of the bill was not proved.

SOUTH LANCASHIRE WATER BILL.

MONDAY, JUNE 19.

Mr. DENISON, Q.C., and Mr. SALISBURY appeared for the promoters; Mr. GORST, for the Earl of Derby and other justices of Lancashire, as petitioners against the bill; Mr. PEMBROKE STEPHENS opposed on behalf of the Hindley Local Board; and Mr. COATES appeared for the petition of Mr. Richard Ainsworth.

Mr. SALISBURY said the bill was one which had passed through the other House, and was an application for an Act of Incorporation, the map before them showing the district which the company wished to supply. The district had grown up rapidly, and portions of the county had been taken up from time to time to afford a supply of water to the inhabitants. Some portion of the county had not any supply at all. At Bolton and other places they had the Manchester water; and the Liverpool and Wigan people also came up for their source of supply. The promoters proposed to take in the township of Ince, and supply that locality with water. Ince had, however, a bill of its own, but an arrangement had been come to, to the effect that they would supply themselves, and so exclude themselves from the bill. The population of the district of South Lancashire, which the bill sought to supply with water, was 70,000. They had no source of supply at all at present. The water which they did obtain was bad in quality and deficient in quantity. In dry seasons they could not get any at all. The inhabitants were supplied with water by persons carrying it round to them, and for which a charge of one halfpenny a bucket was made. The population were employed in manufactures and coal-mines, and were, therefore, in constant need of a good water supply, not only for carrying on their occupation, but also for domestic purposes. The gathering-ground from which the promoters proposed to take the water was desirable, and would produce water of excellent quality. The source of the supply would be Dean Brook. That would be the watershed. From that they would receive 1188 acres of water; and, after making compensation to millowners and others, they would be in a position to supply the inhabitants with 20,000 gallons per day for 70,000 souls. The mains would be carried to Snidell, where there would be a service-reservoir erected. The company asked for power to raise a capital of £100,000, with the usual borrowing powers. There was no opposition on any points of engineering, and neither was there any opposition from land or mill owners. He would, too, produce evidence from the district to show that the bill was received with favour. There was only one exception, and that was the opposition of the local board of Hindley, who wanted the company to supply them in bulk. So, in point of fact, there was not any opposition to supply the district with water. There were only two petitions against the bill, one from the local board of Hindley and the other from the justices of the county. The other—Mr. Ainsworth's—was simply nominal, and was in reality in favour of the bill. The Hindley Board said the supply would be exhausted before it reached them, but there was no truth in such a statement. The fact was, they wished to be supplied in bulk at a price. The promoters were in a position to supply the whole of the district, Ince included. The Hindley people wanted, as said in the House of Commons, two strings to their bow, and to be placed in the position of dealers in the water. That was simply the reason why the local board wished the clause to be supplied in bulk inserted in the bill, but he ventured to say that the local board had no right to be heard on that clause in opposition to the bill. The petition of the justices, he contended, was not the petition of the justices of the county, but the petition of the Earl of Derby and others, who were justices, and they said they came forward to prevent any expense falling on the ratepayers by the laying of the pipes on the bridges of the county; but he hoped the committee would leave them to their remedy under the General Act.

Mr. *James Diggles*, of Higher Hall, West Leigh, examined by Mr. SALISBURY, said he was a coal proprietor, and interested in property at Hindley and in the mines. He had resided there over 23 years, and the district was badly off for water, more particularly Hindley and West Leigh. A good deal of the water was gone. He recollected a large well from which the Hindley people got their water, but it had been dry for the past five years. They had not a spring well from Tamerline End to Victoria Works at Hindley. When it rained, the water was short and very bad—only 20 quarts in 24 hours. All the wells on his estate were at present dry. He did not throw impediments in the way of his neighbours going over his fields for water. It was, he thought, his duty to let them. In 1868 and 1869 his gates were open in all his fields for water. In 1870, from May 12 till October, another well was opened. Hindley was the worst off for water, and notwithstanding the increase of the population from 8728, in 1854, to 17,191, in 1866. The value of the district in 1854 was £16,000, and in 1866, £25,271. The want of water was becoming serious, and only the previous Saturday he saw an old woman ladling water from a mud-pool. He was surprised at the opposition to the bill. He believed the Hindley Local Board wanted two strings to their bow.

By Mr. GORST: He was a large ratepayer. He supposed that he paid county-rates. He did not think it fair that Southport should pay for a supply of water to Hindley.

By Mr. STEPHENS: Is there anything in the bill for you to supply water to the cottagers?

Witness could not say. He believed that the promoters would give 20 gallons per head a day. He only knew that one township was struck out of his district in the bill. He was a promoter of the bill.

By Mr. SALISBURY: They proposed to bring a supply of water to Hindley, and they were bound to carry out the provisions of the Act. As to the rates, he wished to pay as little as possible. As a county ratepayer he knew that the county would not pay for the replacing of the road broken up by the promoters. Whatever was done in the construction and maintenance of the works would be done at the expense of the promoters.

Mr. *John Pilkington* said he resided at Westhoughton, and was a cotton-spinner. There was a very great scarcity of water in his district that had induced him to become a promoter of the bill. The inhabitants had to go a great distance for their water. It was desirable to establish a water-works, and have storeage for the same, as proposed by the bill. He fancied that Hindley should support, instead of opposing the bill. If the proposed works were carried out, there would be plenty of water for himself and those who came after him.

By Mr. STEPHENS: He spoke for Westhoughton and Lostock. He was a promoter of the bill.

Mr. *George Henry Evans*, medical practitioner at West Leigh and the district, said he knew that the district was in want of water. Westhoughton, West Leigh, Atherton, Bedford, and Astley also required water. The water was bad. There was a horrible stench in the house one night, and his servants said it came from the water which had boiled dry in the kettle. That was the supply to his own house. He analyzed it with another medical man and found it to contain nitrates. It contained a quantity of organic matter, and it came from the neighbouring churchyard. He was laying down pipes from Atherton for a supply of water at his own expense. The other wells contained a great deal of vegetable matter. There had been a great deal of sickness, and they were scarcely free from fever. He was surgeon to a glass-works, and the operatives were scarcely ever free from diarrhœa. A new well was sunk to supply the engines, and the men were supplied from that. The result was that fever and diarrhœa disappeared. Before that well was sunk he had as many as 17 cases of diarrhœa and fever in two days.

By the CHAIRMAN: It is generally admitted by medical men that such diseases are attributable to bad water and want of proper drainage.

By Mr. STEPHENS: He was laying down pipes at that moment for his own private supply.

Mr. *Kirkpatrick*, cotton-spinner, and justice of the peace, said for 25 years he had been a member of the Leigh Union. There was a very great want of water. He promoted the bill on public grounds, and not like the last witness—two for himself, and one for the public. The water was decreasing. No doubt the state of affairs would be very bad if they did not get the bill. He never saw a place so much in want of water as Hindley. As an inhabitant, he would like the soft water of the company, and he believed that 99 out of 100 wished the same.

By Mr. GORST: He saw the names of gentlemen who took the lead in the county business attached to the petition against the bill. As a county magistrate he did not know that it would be unfair if Rochdale and Ashton had to contribute to the repairing or rebuilding of bridges caused by the introduction of the proposed water supply. He did not think it would be hard at all.

By Mr. STEPHENS: The Atherton Local Board petitioned that they should be included in the bill. The water which comes from Manchester is known to be very good, but the supply to Atherton was limited, and that was the reason Atherton applied to be included in the bill. The local board of Atherton is within the limits of the bill, but not for a water supply. He should not like to see Ince water in Hindley. He could not give the number of cottages in Hindley. He thought the clause of the Act making provision that, if after seven years the townships mentioned in the bill were not supplied with water, the local board or any other body may supply the district, was a usual clause.

By Mr. SALISBURY: As a justice of the peace he thought the general Act was sufficient for the protection of the county. The county-rate comes out of the poor-rate, and the company would contribute.

Mr. *John Newton*, examined by Mr. SALISBURY, said he was a civil engineer, and in conjunction with Mr. Cawley was engineer to the board, and they had prepared the plans. They would first of all obtain a supply of water from the Dean Brook watershed, and then construct a large reservoir to receive that water. The water level would be 800 feet above the sea, and the capacity of the reservoir would be 250 million gallons, or 130 days storeage. The watershed is 1130 acres, and they would bring the main to Snidell Hill, which is 600 feet above the sea.

By Mr. BONHAM-CARTER: The contents of the service-reservoir they proposed to construct would contain 2 million gallons, or a little more. The supply estimated was 2,099,628 gallons a day. Out of that quantity they must pay to the millowners, or send down as compensation, 730,844 gallons, which would leave 1,368,784 gallons for the use of the company. That was basing it upon the two driest years recorded of rainfall. The Belmont gauge was a noted gauge. Taking 1865, it was 42·60 inches of rainfall, and from that he believed there were 12 inches of evaporation and waste. The total population, exclusive of Atherton, was, in 1851, 42,398. From the first they had not proposed to supply Atherton, except at the request of the local board. In 1861 it was 48,772, and in 1871, 58,789.

By Mr. SALISBURY: The population of Atherton was 7500 at the last census. That made a total of 66,000; 1,900,000 gallons would give 20 gallons a head for the entire population, supposing they all took water, which he had no hope would be the case. They never in practice found the total population take water from a company; 75 per cent., or three-fourths, require a supply. The population on the hillsides and out-of-the-way districts would not take water, and he calculated that 44,000 was the outside at present they had to provide for, including Hindley. The greater part of the district is coal formation, with the exception of a little on the south and a small portion where the reservoirs are. The districts were as much in want of water as any he knew of. He was satisfied that the water would be quite as good as that of Bolton. Hindley wanted water as much as any place in the district, and he was totally unable to understand why the local board opposed the measure, unless they wanted to get the company to supply in bulk at a very low price. It was proposed to give the water to them on the same terms as any other part of the district. The promoters already had the water from Ince, and if Hindley liked hard water they could have it. They proposed to cross nine bridges belonging to the justices, and there was room in every case to pass between the top of the arch and the surface of the ground without touching the bridge. As he understood the opposition, the justices wanted, if they thought fit, to build a wider bridge, or of a different character, and that the company should alter the pipes as the justices thought fit. He thought that unreasonable.

By Mr. STEPHENS: They had arranged with the millowners for dealing with 1130 acres, and if in 30 years after the company should be short of water, then would be the time to consider whether they should arrange for another 30 years. He stated, in his evidence before the House of Lords, that the population was 78,388. The calculation was the same as given in the House of Lords—75 per cent. of the entire population to be supplied.

Re-examined by Mr. SALISBURY: The company were in a position to give Hindley 300,000 gallons per day, and no doubt, if required, they could arrange with the millowners to give more. If the bill passed he had no doubt the Hindley people would take water from them, and not from Ince. The capital was £100,000. His estimate was £60,000, and there were distributing-mains £10,000, which would make £70,000.

Mr. *Cawley*, M.P., and partner with the last witness, said he knew the country well, and with the preceding witness drew out the plan. He apprehended the Atherton people did not wish to be left to get their water from Manchester, which would be precarious, and the same might be said of Hindley. The proposed water supply is good, and he had no doubt, if the works were constructed, it would be a paying concern. He would be very sorry to lead any person to suppose that he would realize 10 per cent. If they could get 5 or 6 per cent. it was as much as they could expect for some time to come. It was the best scheme they had for obtaining a supply of water. He could not see why the legislation as regarded bridges should be any different as regarded county bridges to any other.

By Mr. GORST: He knew the gentlemen signing the petition as taking a leading part in the magisterial business of the county. He agreed with those gentlemen taking a part in the finances of the county, but he did not think that they did the same as regarded the question of the laying down of pipes. The supply of water in bulk would be a privilege. There were only two propositions in the bill—one to supply water for domestic use, and the other was to supply in bulk, to be distributed by the local board.

By Mr. STEPHENS: Did not think that the Hindley people should be left to the mere chance of the local board obtaining a supply from an untried source. He declined dealing with any local board compulsorily.

By Mr. SALISBURY: If the local board would be responsible, no doubt the company would agree. If the works were constructed, it would be cheaper for the inhabitants to have the water on the terms of the bill.

By Mr. STEPHENS: They estimated that 20 gallons per day could be obtained for domestic and sanitary purposes in ordinary towns. The trade supply was very varying, and in Manchester the consumption was 16 or 18 gallons per day for domestic purposes, but in a scattered population like the district proposed to be supplied the consumption would be less. There would, no doubt, be 30 inches of rainfall obtained. The reservoir will hold 10 inches of rainfall, and although, in a certain year, it will be below 30 inches, it will be made up from the reservoir, and with 30 inches the daily supply will be 1,336,800 gallons.

Mr. *Joseph Jackson*, civil engineer, knew the Dean Brook watershed, which contained capital water. The plan for obtaining water, he thought, was well laid out. He thought the compensation to the millowners was fair. No district in Lancashire was so badly off for water that he knew of. Liverpool

wanted all the water they had. He knew of no Act of Parliament with clauses such as those sought to be inserted by the justices of the county of Lancashire.

By Mr. STEPHENS: The Rivington gathering-ground is larger than the one from which the promoters would take their water; but as to its yield of water it was to be compared to it in proportion to its extent.

By Mr. SALISBURY: But the proposed gathering-ground was sufficient for the purpose. He knew nothing about the Ince Bill, or that it was passing as an opposing bill.

Mr. *T. Spencer*, analytical chemist, said he had 30 years experience in connexion with water companies in South Lancashire. He knew the district well. He had two samples of water of the South Lancashire, of which he had made analyses. No. 1, Dakin's watershed, was taken on the 14th of March, 5 p.m., by Arthur Holden. No. 2, Dean's Brook, was also taken on the same date, and by the same party. Dakin's water contained carbonate of lime, 0·65 of a grain in a gallon; sulphate of lime and magnesia (gypsum), 2·96; chloride of sodium or common salt, 1·85; iron, 0·04; silica, 0·18; organic matter and loss, 0·40; total solid residue in a gallon, 6·08. Dean's Brook—carbonate of lime, 0·60; sulphate of lime and magnesia (gypsum), 4·50; chloride of sodium or common salt, 1·20; iron, 0·09; silica, 0·16; organic matter and loss, 1·08; total solid residue in a gallon, 7·63 grains to a gallon. The water was very good. There was a difference in No. 2, as compared with No. 1, but even in No. 2, where the organic matter abounds, the most of it was not so much as he found in London water. He found no traces of animal matter. With regard to the hardness, No. 1 had 3·6, according to Clark's scale; No. 2 contained 5·1; in round numbers, say, No. 1, 3½°; and the other, 5°. Hindley was so very badly off for water that he thought they ought to be very glad of the bill, but their opposition might arise from financial causes.

By Mr. STEPHENS: As far as the domestic supply was concerned, if he was an inhabitant of Hindley, he should not think of the Ince water if any other could be obtained. A person might pay too much for anything. It would be to the advantage of the company not to charge too high. The Ince water is supplied from sandstone. He had reported in favour of Southport water from sandstone. Although he spoke of the red sandstone district, that was divided into a great many, and one sub-district gave water much harder than another. There were others, such as the Green Lane well, at Liverpool, just the other side of the ridge. They had almost an unlimited supply of water—that was to say, they began with about one million gallons, and he thought now they got two million out of it, but it came from an immense district.

TUESDAY, JUNE 20, 1871.

The CHAIRMAN asked Mr. Gorst whether, supposing the committee were not inclined to grant the clauses which he required to be inserted in the bill, he wished to be excluded from the bill altogether.

Mr. GORST replied that he did.

Mr. STEPHENS then addressed the committee on behalf of the local board of Hindley. He said the nature of the bill had been clearly explained the previous day. The capital of the company was stated to be £70,000, and that £100,000 would cover the expenses of the works. But the point he wished to lay most stress upon was the answer given by Mr. Cawley, the engineer, who had himself said the scheme was an expensive one, and that was admitted by all the promoters. That was, then, the chief reason why he, as the representative of the local board, appeared to oppose the bill. The local board were surveyors of the highways, and had the indisputable power of laying down mains for a water supply to the inhabitants, in the same manner as they would lay down pipes for sewage purposes. Repeated instances had occurred, after water companies had been established, of local boards applying to Parliament to buy them up. The district was inhabited by operatives and manufacturers, and, when dealing with the humbler classes of occupiers, on all occasions it was absolutely necessary that a good supply of water should be afforded them. Water should be given to those who were on the spot, in preference to those who occupied an outside district. Their only object was to get necessary accommodation for the district. His learned friend had said that there was no opposition to the bill; but he (the speaker) had a record of what had taken place before the House of Lords, and he found that there were then no less than fifteen distinct appearances, and no fewer than the views of thirteen petitioners had been embodied, in some form or other, in the bill. But when they came to look at the bill minutely, Hindley appeared to be a district which declares that it does not believe in the quantity of water which the promoters say they have at their command. He could not help being struck with the fact that the compensation would be large which the company would have to give. His opposition was a local one, and he could not shut his eyes to the enormous expense which would be incurred by compensation. The local board were actually about seeking a supply when the two proposed schemes came out. If the bill would give them a supply in bulk, that was all they wanted; but they thought is hard that their hands should be tied for seven years by the bill. He then said he had not heard one independent witness examined for the bill, and even Messrs. Cawley and Newton were engineers to the promoters, and consequently interested. A great deal had been said about want of water at Hindley, but they wanted a bill which would provide for carrying the water into the whole of the entire district. He would, therefore, ask the committee to consider what it was that the Ince people really wanted. Water was not an article for persons to trade in. Again, the promoters would, if the bill passed, have a trading company, and it may or may not succeed. Then, as a local board, his clients said they had a right to get water on the best terms they could. They had no private ends to serve; but, on the contrary, they wished to serve all alike, and perform simply a public duty.

Mr. *George Heaton*, examined by Mr. STEPHENS, said he was surveyor to the local board of Hindley, and the bill had been submitted to him. The proposal for a water supply at Hindley was not satisfactory. There were a great number of poor cottagers there. Public bodies, such as the the Hindley Board, studied the consumers more than the public. It usually happened that pipes were laid down, and those who wanted a supply would guarantee 5 per cent. If the promoters got their bill, they would have a power of breaking up the streets, which was objected to by the local board. The local board wished to retain the power of compelling owners to supply small houses and cottages. If there was a supply in bulk, at a fair price, it would be in the end a good thing for the company, as there would be more consumers. The evidence before the House of Lords was that 15 gallons per head would be supplied. By the time the water was ready for distribution, the local board would bring 2000 houses for a supply. It would be a saving to the company if the local board took the water from the company. At Illsley the price would be 3d. per 1000 gallons. The cost of laying down the pipes, &c., would be £4600, and the working expenses would be about £360. At St. Helen's, Wigan Blackburn, and Bolton, the charges for water for cottages under £10 was 83 per cent. He considered the scheme a costly scheme, and the charges, at all events, too high. The application to Parliament on the part of Ince was made by the local board. If they took the bill as it stood, it would pay the Hindley people to have works of their own. The Ince Bill left the local board free to have water at the end of the township, and also left them free to distribute it themselves, but the proposed bill did nothing of the kind. There was a resolution of the local board with reference to obtaining a supply of their own.

Mr. SALISBURY applied for the resolution, which was produced, and was dated Sept. 14, 1869; and it was moved by Mr. Marsh, seconded by Mr. Tilsley—"That the surveyor should report on a water supply." The counsel then read the report.

Witness continued: The estimate for the scheme proposed in the report was £21,310. By the expenditure of an additional £5000, and the payment for the water also, they could get the supply from the promoters of the bill. He would prefer sandstone water for domestic and drinking purposes, because it was harder. In 1869 the feeling of the board was that it was too late to go to Parliament. Nothing was then done, and subsequently the present scheme came out. He would swear that the reason was not because they were afraid to expend £21,000. There were several schemes brought out; the present one just after the report was made. He reported to the board that two schemes were brought out as soon as he got the information. It was conveyed verbally by conversation, as the result of a rumour. He could not tell the exact date, but should say July or August. Could not say he never heard a word about it before October. There were resolutions of the board later on to the effect that the scheme should be opposed. He was in the House of Lords when Mr. Pennington was examined. He was connected with the local board. Heard the question put by Mr. Denison: "Has there been any resolution of the board that the board should oppose the South Lancashire Bill?" He did not keep the book. The clerk of the board did that. He knew the prices put into the clauses were maximum prices. He did not know of any Act of Parliament where the rates of charges were lower than proposed in the bill. He could state that they were lower at Wigan. The supply of 20 gallons per head would be sufficient, and he knew that evidence had been given that the bill would give that supply. There were 2100 houses, which were scattered about, which were in want of water. If the local board got the water from the promoters, they wanted it in bulk, if they had it at all, because, if otherwise, they would be entirely in the hands of the company. The Hindley people could compel the company to supply the district according to the terms of the Act; that was, at 10 per cent. on the outlay. He referred to the 10 per cent. clause. The reason why they wanted water in bulk was because they wished to distribute the water equally over the district, and another reason was that the local board did not think the whole district would get supplied. Another reason was that, if the company did not complete their works, the board would be in their hands for seven years. It was not the object of the local board to sell the water at a profit, but to give water to the inhabitants without loss to themselves. If the company broke up the streets and highways, they would be bound to replace them, and they could not break them up without giving notice. The following resolutions were passed previous to the local board appearing in opposition to the bill in the House of Lords:—"February 24, 1871. Moved by Mr. Gilroy, seconded by Mr. Johnson—That the Liverpool Water Companies Bill be opposed. Mr. Lowe then moved, and Mr. Smith seconded—That a petition be presented against the South Lancashire Water Bill. Mr. Johnson moved, and Mr. Gidloe seconded—That the arrangements entered into with Ince be left with the law clerk." There were many resolutions of the board, but he did not know how many. When the resolution was passed ordering the surveyor's report to be printed, he was not aware of any resolution referring to the scheme. There was a resolution of the board as follows:—"Resolved—That all due encouragement be given to the South Lancashire Company, and that the details be left with Mr. Taylor, the law clerk, and a sub-committee who were appointed to reply to the Liverpool Company, and the local board of Ince." There was no proposal in the bill to supply in bulk.

Mr. *Rawlinson*, civil engineer, examined by Mr. STEPHENS.

Did not want to say anything against the bill, but, taking the population and the area of the gathering-ground, he did not think the proposed scheme would give a full supply of water. But they could, perhaps, get more water. He thought Hindley should be left out. It was the duty of the local board to supply the inhabitants, and levy a rate in aid. He thought a clause should be inserted to supply the local board on equitable terms. It was a fact that more and more the water control was passing into the local boards. The Act made it imperative that, before the local board could throw the fetters of a company off, they must give compensation, and in some instances to a great amount, for works comparatively worthless. As to water, they must make the rich pay for the poor. He paid himself nearly £10, while the cottagers paid 10s. They could not get from that. He did not think it just that any township should be tied up for seven years by a company who could not, or would not, supply a township. The last witness was with him, and was a person of great ability, and had much more in him than appeared. It was generally the case that waterworks do not pay for some years. It must come out of capital, while a local board paid by rates. He believed that an abundant supply could be got from the red sandstone. If the local board required water, there was no law to prevent them obtaining it.

Mr. DENISON: Why should Hindley have its application for water in bulk granted?

Witness: Because I believe they have a right to ask for it.

Mr. DENISON: But how will getting water in bulk put Hindley in a better position than obtaining water in the ordinary way?

Witness: Because the local board would have mains at the nearest point, in order to serve all alike; and that was what the company, he believed, would not do.

Mr. DENISON replied on the evidence in support of the bill, contending that the local board had power to deal with Ince, and carry their mains to Hindley, instead of making use of the promoters. He would, therefore, ask the committee to accede to the application, and not strike Ince out of the bill. The bill simply was brought out by the company to give them a reasonable profit for their outlay in constructing the works. No doubt Hindley was a profitable place to supply with water; but it must be borne in mind that the company would have to provide reservoirs and all the necessary paraphernalia of a water company. And why, he would ask, should the company be deprived of their profit simply because of the whim of the local board? He hoped, then, the bill would be left as it was when it passed the Lords. Hindley could not possibly wish to be struck out of the bill, because Hindley wanted water very badly. Again, he would draw the attention of the committee to the fact that not a single member of the local board attended to give evidence in the witness-box; but he did not care if all the chairmen of local boards had been present, as the party were simple and spoke for themselves; and he would ask any one if it could be at all the wish of the Local Board of Hindley to be struck out of the bill.

The room was then cleared, and, on the readmittance of the public,

The CHAIRMAN said the committee were of opinion that the preamble of the bill was proved.

Mr. GORST, on behalf of the justices of the county of Lancaster, in opposing the bill on the ground that a clause was not inserted providing against any expense being placed on the shoulders of the ratepayers, called

Mr. *Assheton Cross*, M.P., county magistrate, who said no provision was made in the bill protecting the ratepayers.

Mr. *Radford*, bridge-master for the county of Lancaster, said that the bench withdrew their opposition to the tramways in consequence of the passing of the General Tramways Act, and a clause being inserted in the same.

Mr. SALISBURY, for the promoters, replied, and contended that there was no law to compel the company to incur expenses, if the local board wished to build one or any of their bridges. He considered that he had proved his case, and asked the committee to pass the bill.

The committee accepted Mr. Gorst's clauses for the justices, and the others, which Mr. Stephens represented, were thrown out.

MUNICIPAL CORPORATIONS (BOROUGH, &c., FUNDS) BILL.

A BILL to authorize the application of the Borough and other local Funds of Municipal Corporations and other local Governing Bodies in England and Wales in certain cases.

WHEREAS by section seventy-five of the Act passed in the session holden in the fifth and sixth years of the reign of King William the Fourth, chapter seventy-six to provide for the regulation of municipal corporations in England and Wales, and by a subsequent Act passed in the session holden in the twentieth and twenty-first years of the reign of Her Majesty, the trustees acting under any Act of Parliament for supplying any borough, or any district within or beyond the limits of a borough, with water or gas, or having powers for providing or maintaining any cemetery or market in or for any borough, or otherwise improving the same, are authorized and empowered to transfer to the body corporate of such borough all their rights, estates, properties, and liabilities:

And whereas by the ninety-second section of the said Act of fifth and sixth William the Fourth, chapter seventy-six, the annual proceeds of all property and hereditaments belonging to any body corporate, and all fines and rates levied in any borough, are directed to form the borough fund, and such fund is directed to be applied in the payment of certain salaries and the expenses incurred in carrying into effect the provisions of the said Act, and the surplus (if any) of such fund is directed to be applied, under the direction of the council, for the public benefit of the inhabitants and the improvement of the borough:

And whereas the Public Health Act, 1848, the Local Government Act, 1858, and various local Acts of Parliament, have conferred powers of improving, cleansing, paving, lighting, and otherwise governing places or districts, not being municipal boroughs, upon boards of health, commissioners, trustees, or other persons:

And whereas it is expedient to extend the powers of bodies corporate and the council of any borough, and the boards of health, commissioners, trustees, or other governing body of any of the said places or districts, not being municipal boroughs, and having a population of not less than *five thousand* inhabitants, so as to enable them to apply the borough fund or any part thereof, or the funds under the control of such boards of health, commissioners, trustees, or other governing body, towards the expenses of promoting and furthering bills in Parliament, and other proceedings having for their object the public benefit of the inhabitants or improvement of their respective boroughs and places or districts, and of opposing any such Bills in Parliament or other proceedings as may be injurious to the same, and of prosecuting or defending any proceedings necessary for the protection of the interests of such boroughs or places or districts:

Be it therefore enacted by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:

Interpretation of Term, "Governing Body."

1. The term "governing body" in this Act shall mean the council of any municipal borough, the board of health, commissioners, trustees, or other body acting under any Act of Parliament for the improvement, cleansing, paving, lighting, and otherwise governing places or districts not being municipal boroughs, and having a population of not less than *five thousand* inhabitants.

Costs of Promoting or Opposing Parliamentary and other Proceedings for Benefit of Inhabitants to be Charged on Borough and Local Funds.

2. When in the judgment of the governing body of any borough or place, declared and confirmed as hereinafter provided, it is expedient for the governing body to promote, further, or oppose any bill or bills in Parliament with relation to any market, exchange, hall, courts of justice, tramways, slaughter-houses, gas-works, water-works, or any other matter which in the opinion of the governing body will be for the public benefit of the inhabitants or improvement of the borough or place or district, or which may, in the opinion of the governing body, be injurious to the borough or place or district, or to prosecute or defend any proceedings necessary in the judgment of the governing body for the promotion or protection of the interests of such inhabitants, it thall be lawful for such governing body to apply the borough fund or other the public funds under the control of such governing body, to the payment of the costs and expenses attending the same; and all costs, charges, and expenses incurred or to be incurred in and about the matters aforesaid or any of them shall be deemed expenses to be lawfully chargeable upon and payable out of the borough or other public funds, in the same manner as the other expenses in the said ninety-second section of the fifth and sixth William the Fourth chapter seventy-six, now are charged upon and paid out of the borough fund, or as under the said other Acts are now payable out of public funds, in places or districts not being municipal boroughs: Provided always, that no such expense shall be incurred unless in pursuance of a resolution of an absolute majority of the whole number of the governing body, declared and carried at a meeting of the governing body, after ten clear days notice by public advertisement of such meeting and of the purpose thereof, and unless such resolution is confirmed by a like majority at a special meeting of the governing body held not less than seven clear days after the first meeting, and after seven clear days notice by public advertisement of such last-mentioned meeting and of the purpose thereof has been given.

Power to Minority to object by Appeal to Secretary of State.

3. If the expediency of any such resolution by the governing body be objected to in such governing body, it shall be lawful for the minority of such governing body, being not less than one-third of the whole members thereof, or for one-third in number of the rated inhabitants of any such borough or place, to memorialize the Secretary of State for the Home Department, stating the grounds of their objection; and such Secretary of State may, after making such inquiry as he thinks necessary, by order under his hand declare that the costs and expenses attending the proceedings comprised in such resolution shall not be chargeable upon and payable out of the borough fund or other the public funds under the control of such governing body.

Costs to be taxed.

4. That all costs and expenses incurred under the powers of this Act shall be taxed by the taxing officer appointed by the House of Commons, or by some other person authorized by the Secretary of State for the Home Department for that purpose.

Authority to Secretary of State to authorize Expenses previously incurred.

5. Where before the passing of this Act expenses have been incurred by or on behalf of any governing body, in accordance with any resolution of such governing body, in promoting or furthering bills in Parliament or other proceedings having for their object the public benefit of the inhabitants or improvement of their borough or place or district, or in opposing any such bills in Parliament or other proceedings as they deemed injurious to the same, or otherwise in defending the interests of such borough or place or district, it shall be lawful for the governing body to present a memorial to the Secretary of State for the Home Department, at any time within *six months* after the passing of this Act, setting forth the circumstances under which such governing body seeks that the provisions of this Act shall be applied to the expenses so incurred, and the said Secretary of State, after making such inquiry as he thinks necessary, and hearing any objection which may be made by any rated inhabitant of such borough or place or district, may, if he thinks proper, by order under his hand, order, and direct that the provisions of this Act shall apply to the expenses so incurred or any part thereof, and thereupon the same shall be charged and payable out of the borough fund or other public fund in the control of the governing body, in the same manner as if the same had been lawfully incurred by such governing body after the passing of this Act.

Legal Intelligence.

SOUTHWARK POLICE COURT.—WEDNESDAY, JUNE 21.

(*Before* Mr. PARTRIDGE.)

David Davis, of 44, Harley Road, Kennington, was summoned by Mr. Crookenden, secretary of the Phœnix Gas Company, for £10 6s. 5d., for gas supplied to him, and used and enjoyed by him at his premises, situate at 57, New Cut.

Mr. HALE appeared for the plaintiff, and Mr. HICKLIN for the defendant.

Mr. HALE stated that the defendant applied at the office, of the Phœnix Gas Company, Bankside, for gas in the name of Lewis Davis, on the 24th of April, 1869, that the gas was turned on on the 7th of May upon his paying a deposit of £10, and that he left the premises in March, 1870. At that time there was gas-rent due to the amount of £20 15s. 7d., and after allowing for deposit and interest (£10 9s. 2d.) a balance was left of £10 6s. 5d. He might inform his worship that a summons was taken out against the defendant in the name of Lewis Davis, to which he did not appear, but an order was made, and a distress warrant issued and executed, but withdrawn, and a summons obtained in the defendant's right name. He also understood that the case was adjourned from last Saturday, as his worship thought it necessary to produce the written contract, but he had to inform his worship that it was not necessary to have a written contract, and he referred to the Phœnix Gas Act, as the secretary wished that point to be made clear.

Mr. PARTRIDGE said he did not mean that he required a written contract, but a proof of the agreement.

William Sanderson, the inspector, was called, and said that the defendant applied at the office, Bankside, on the 24th of April, 1869, for gas to be supplied to him at 57, New Cut; that he afterwards called on him, and gave him a card with the terms of supply, demanding a deposit of £10, that the deposit was paid, and the gas turned on on the 7th of May. He recognized the defendant as the party he saw on several occasions.

William Warner, service layer, said he received orders from last witness to turn on the gas at 57, New Cut, which he did on the 7th of May, 1869. He recognized the defendant as the party he saw there, who gave instructions about the gas. He had also seen him several times since in the London Road.

Henry Cox, assistant inspector, proved the consumption of gas. He took the index on the 2nd of April, 1870, when he found the house shut.

Richard Reeve, the district collector, recognized the defendant as the party he saw there on different occasions. He also proved receiving on the 30th of December, 1869, the sum of £8 16s. 5d. for gas due to Michaelmas.

Sidney Robert Drane, the arrears collector, said that knowing the defendant was indebted to the company, he called on him at his father's shop in the London Road, on the 21st of April last, and demanded the amount, £10 6s. 5d. Defendant said it was nothing to do with him. Witness told him it was, and that he could prove it. Defendant said, "What then?" Witness said he wanted the money. Defendant refused to pay, and a summons was obtained in the name of Lewis Davis, but defendant did not appear, and the present summons was obtained.

Lewis Davis said it was his shop, and that he paid his brother £2 per week to manage it, and that he paid the deposit in the Kennington Road.

Isaac Davis, the father, said that it was Lewis Davis's shop, that he paid both his sons as assistants to him. In answer to Mr. Hale, he said he did not tell Mr. Drane at the gas company's office that his son Lewis had been gone to America six months. He might have said he was going to send him.

David Davis, the defendant, said it was his brother's shop, and that he managed it for him, and received a salary of £2 per week. In reply to Mr. Hale, he said he did not remove his goods in the middle of the night.

Mr. PARTRIDGE said that it was a clear case of conspiracy on the part of the brothers to commit a gross fraud on the gas company, and he must say the father was guilty of great negligence. He should make the order for the defendant to pay the amount claimed, £10 6s. 5d., and considering the company had been put to a great deal of trouble and expense, he should order £5 5s. costs.

Defendant asked for time.

Mr. PARTRIDGE said no time would be given, and that a distress warrant would issue. He also inquired if he had sufficient goods to distrain on.

Mr. *Drane* informed his worship he had.

Mr. PARTRIDGE said he should require his father or some responsible person to be bound in the sum of £20 for the order to be carried out.

The required security being given, the defendant left the court.

Miscellaneous News.

METROPOLITAN BOARD OF WORKS.

At the Meeting of the Board, on Friday, June 30, Colonel HOGG in the chair,

The Parliamentary Committee presented a report on the Metropolis Water Bill, giving an account of the course adopted by the select committee of the House of Commons, to whom the bill has been referred. It pointed out that since the second reading of the bill it had been so altered by the Government as to completely destroy all that was valuable in it in the interests of the consumers, and give increased advantages to the water companies. Counsel was employed by the Board to appear before the select committee, and he was called upon by them at very short notice to present such clauses as the board desired to be inserted. The solicitor of the board accordingly drew up clauses which, if adopted, would restore the bill very much to what it was like when first introduced. They were submitted to the select committee on Monday last. In consequence of some proposed arrangement between the counsel on both sides, the committee adjourned till next Wednesday.

The report proceeded to say that the bill in its present state is practically reduced to one for the establishment of a constant supply, and even this is to be much less effective than was originally proposed, inasmuch as it is not to be given at high pressure—that is, at such a pressure as to reach the tops of the highest houses. This provision is admitted, and the present levels of the various companies are to be retained. The board have always hoped that in any new legislation with respect to the water supply, high pressure would be provided for. The importance of it for fire extinguishing purposes amongst others, can hardly be over estimated. Again, as regards the other important point which has been altogether conceded to the water companies—viz., the making of the regulations as to the conditions and mode of the constant supply, the fittings to be used, and the cost of the same, and for the prevention of waste, &c., the original bill properly provided that these regulations should be made by the board. It was now proposed that the companies shall make their own regulations, and that the board shall simply have the power of objecting and making suggestions to the Secretary of State, to whom the regulations are to be submitted for approval. Your committee consider this new provision to be a serious defect in the bill. Experience has shown the necessity of some principal authority standing between the companies and the consumers, to protect the latter from the vexatious and irritating regulations which are made by the companies, when they have the power to do so. It is true that the board would have the power of objecting to any regulation which they looked upon as vexatious and unnecessary, but they could not enforce their objections. They could only submit them to the Secretary of State, with whom would rest the power of allowing or disallowing them. Doubtless this is better than leaving the matter entirely to the companies, but it would be much more satisfactory that the regulations should be made in the first instance by this board as the municipal

authority than that they should only have a power of appeal. As to the provision that all the expenses connected with the preparation and passing of the Act should be paid by the board, they have already expressed their opinion that this is quite unreasonable. If the measure were one likely to be of great benefit to the inhabitants of the metropolis, and which was consequently approved by the board, the case might be different. But to call upon them to pay the heavy expenses connected with the passing of a bill which, in their opinion, fails to deal with the question in a satisfactory manner, is a proposal to which they feel bound to object. The bill came before the committee of the House of Commons on Friday last. After the opening speech of Mr. Serjeant Sargood, the counsel for the bill, Mr. Dowson, as representing some of the companies, called upon the board's counsel to state what position they assumed with regard to the bill, how far they desired to have it extended, and what clauses they had to submit for the purpose. And although the board's counsel stated that they had then no clauses to submit, and were there simply to oppose the bill, the committee decided that the board ought to be in a position to submit clauses, and required them to do so by the following Monday morning. Your committee accordingly met on that day, and as there appeared to be no alternative but to comply with the requirements of the select committee, they agreed to a series of clauses prepared by the board's agent, which were adapted to carry out the expressed views of the board, and, in fact, substantially to restore the bill to its original shape, in which it met with the approval of the board. Your committee directed that these clauses should be submitted to the select committee when they met, and they now report the course which they consider it advisable to take, and request the sanction of the board thereto.

Mr. NEWTON moved the adoption of the report, and expressed regret that the Government had withdrawn the original bill, which would have given the board power in the interest of the ratepayers to draw up regulations for the control of the water supply. The clauses prepared by their parliamentary agent and solicitor were simply drawn to bring the bill back to its original form. He did not approve of the present bill, because he believed, although it was said to contain provision for a constant supply, it would not bring about that result. Unless the bill could be restored very much to its original form, the inhabitants of the metropolis had better be without any fresh legislation on the subject.

Mr. D. ROGERS seconded the motion, which was put and carried.

BRITISH ASSOCIATION OF GAS MANAGERS.

TUESDAY, JUNE 13.

The first business at the afternoon sitting was the appointment of scrutineers of the votes for the election of the committee for the ensuing year.

Mr. Longworth and Mr. Hutchinson, jun., were unanimously appointed scrutineers.

The PRESIDENT stated that the committee had received a telegram from Mr. Paterson, expressing regret that, owing to pressure of business, he was unable to attend the sittings of the association, and that from the same cause he had been unable to prepare his promised contribution on the "Lithology of Gas Coals."

REPORT OF THE COMMITTEE ON SUNDAY LABOUR IN GAS-WORKS AND THE ESTABLISHMENT OF A BENEVOLENT-FUND.

The HONORARY SECRETARY read the following report of the committee, to whom, at the last annual meeting, the consideration of these two subjects was referred:—

London, June 5, 1871.

To the President, Committee, and Members of the British Association of Gas Managers.

Gentlemen,—At the annual general meeting held last year, the question of establishing a benevolent-fund, which was introduced upon the motion of Mr. Warner, and during the same sittings the reduction of Sunday labour, which was discussed in consequence of a paper read upon that subject by Mr. Morton, were thought fit matters for reference to a committee, who were requested to report thereon. This they beg to do as follows:—

Your committee's first endeavour was to ascertain the feeling of the members individually on both these subjects, and with this view a circular was prepared embodying the resolutions your committee had come to, and appending questions to which you were asked to reply.

A copy of this circular was sent to every member of the association.

The committee also exercised the power granted to them of increasing their number, and accordingly invited Messrs. Warner, Simpson, Methven, Eldridge, and Kelsall to co-operate with them. To this Messrs. Warner and Kelsall declined, the other gentlemen, however, responded to the invitation and afforded assistance.

With regard to the benevolent-fund, an analysis of the replies may be tabulated thus:

There were 92 replies.

To the first question: "Is such a fund necessary?"	40	say "Yes."
	40	say "No."
	3	consider it doubtful,
	1	thinks it is,
	2	don't know, and
	6	give no opinion.
To the second question: "Should the subscription be voluntary?"	38	say "Yes,"
	24	say "No,"
	2	consider it doubtful, and
	28	express no opinion.
To the third question: "In the event of your considering it desirable that a fund should be formed, what amount would you be willing to subscribe annually?"	1	says £3 3 0
	1	says 2 12 0
	8	say 1 1 0
	3	say 1 0 0
	9	say 0 10 6
	7	say 0 5 0
	1	says it would depend on the scheme,
	2	would subscribe according to necessity,
	13	would be willing to subscribe whatever appeared to be the usual sum,
	9	say they would not subscribe, and
	29	give no reply.
To the fourth question: "Do you know of any cases requiring the assistance such a fund would afford? If so, please to give particulars."	No cases are known.	

From this table it will be seen that only 40 among upwards of 300 members are distinctly in favour of the establishment of such a fund, and not a single member at present appears to know a case in which help from such a fund is needed.

Under these circumstances, your committee were unanimously of opinion, much to the regret of several of them at least, that it would not be advisable to recommend to the association the formation of a benevolent-fund. They venture, however, to suggest that in case of any member needing help, application should be made to the association for assistance, when the committee might investigate the case, and if found to be one deserving of help, would no doubt head a subscription list, and send a circular, or otherwise communicate with the members generally.

Beyond this, your committee at present do not think it advisable or practicable to go, but they do not wish in any way to damp the very benevolent spirit which has prompted this inquiry, and has again been manifested in some of the answers to the circular.

In reference to Sunday labour, your committee have to report that though the number of replies to these questions is not so great as they could have wished, still with very few exceptions the answers have shown an earnest desire to do all that was practicable towards relieving the monotony of constant labour by giving the men an opportunity of spending the day of rest with their families, or of devoting it to a higher purpose.

The following table gives a general view of the nature of the replies to the questions in the circular, but without copious extracts it is impossible to convey an accurate idea of the feeling on this question:—

There were 71 replies, from which it appears that

The average Sunday consumption to the average week-day consumption is 72 per cent.

58 say that they have turned their attention to the reduction of Sunday labour.

11, judging inferentially, have not done so; and

2 make no reply to the question.

24 state that they have not found it practicable to reduce Sunday labour; while

7 have reduced it very considerably,

4 but slightly, and

33 have reduced it on the average 35 per cent.

3 make no reply.

From the consideration of these returns, your committee formed the opinion that the matter of greatest importance was to discover and place before the members some clear and definite plan, whereby this most desirable object—the reduction or abolition of Sunday labour—might be accomplished, the object aimed at being the total stoppage of work (in the day time at least) on the Sunday.

This has been very nearly accomplished by different members of the association in various parts of the country, and in different ways.

One of the chief supposed difficulties has been the want of gasholder room, but your committee are prepared to say that only to a very limited extent is this a difficulty; in fact, one case was mentioned where last winter Sunday work was stopped, in consequence of there being insufficient room for the gas had the retorts been kept working.

The real question is one of retorts. If the number of retorts in use is such as to produce rather more gas each day than is consumed, the work on Sunday may be very well suspended; but the common practice is to make rather less gas each week-day than is used, making up the deficiency on Sunday.

This plan of making up on Sunday for the deficiency of the week is manifestly wrong. It is quite enough, at any rate, to make as much gas on the Sunday as is consumed on that day, which appears to amount on the average to 72 per cent. of the week-day's consumption.

From the replies received, it seems that the great majority of managers are really anxious to reduce the Sunday labour, if some definite plan can be shown to them; and your committee consider their time and labour will be thrown away, unless they succeed in showing how it is to be done without injury to retorts, &c., and at the lowest possible cost to the company.

The following plan is the one which your committee think the most satisfactory, but they do not put it forward as an ultimatum, though they consider that if it were generally adopted much might be achieved in the right direction. But while recommending one plan, they do not wish to appear in any way to interfere with individual action; so that should any manager discover a more excellent way, let him, by all means, make it known.

It has been proved that clay retorts are not injured when left for 12 hours beyond the usual time, if the charges remain in and the lids on, the small quantity of poor gas that is made being allowed to escape from the hydraulic main, either by opening a cock or taking out a 2-inch plug, one 2-inch hole being sufficient to permit the escape of gas from 70 mouthpieces.

Acting on this, a few weeks ago some experiments were made, and are still continued at the London works, by Mr. Morton; at the Phœnix, by Mr. Woodall; at the Richmond, by Mr. Eldridge; and at the South Metropolitan, by Mr. Livesey; and your committee are happy to say these experiments have given the greatest satisfaction to *all* concerned.

The men working on the Saturday night complete their work by Sunday morning at six o'clock, when, instead of being succeeded by the day gang, the retorts remain idle until six in the evening, the charges remaining in with the lids closed, and the gas made—say, until nine o'clock—passes into the holders, but at about that time the plugs in the hydraulic mains are taken out, and the gas then being produced escapes. This causes no inconvenience whatever. At the same time the engine and the exhauster are stopped, the dampers of the chimney closed, and the fires fed with breeze—this necessary work being done by one fireman to seven or eight furnaces. For this purpose odd men may be obtained, so that every regular man who would have had to come to work at six a.m. has the day of rest until six p.m. to himself. The men leaving work at six p.m. on Saturday return at six p.m. on Sunday, while those leaving at six a.m. on Sunday return at six a.m. on Monday; thus giving every man 24 hours off every week, and consequently changing from night to day work weekly. This is a boon highly appreciated by the men, for it does away with that very exhausting 18 hours work which occurs at the change on the old plan.

When work is resumed at six p.m., the exhauster is not started until a portion of the beds are charged, which is done all round as quickly as possible, and on the Sunday evening no inconvenience is felt. The make of gas during the Sunday night is quite as great, and in some cases rather more than during other nights, owing most likely to the heats being better. This at any rate proves that the retorts are not damaged.

As to pay, your committee think that the system that regulates all ordinary manual labour should apply here—that is, that men should be paid only for the time they work.

At the works mentioned no pay is given for the Sunday to those men who do not work, and this has caused no discontent whatever, the men being all of them so thankful for the relief given. It will be seen that on one week one gang receives pay for six days, and the next week that gang gets paid for seven; while the second gang then has the six days work and pay.

Your committee would urge upon their brethren the necessity of doing all they can to alleviate the exhausting and monotonous labour of the stoker, feeling quite certain that a movement of this kind, though entailing a trifling expense to the company, is productive of so much good, that the gain far exceeds the loss. They are not quite sure that even pecuniarily, in the long run, there will be any loss at all. The Sabbath was made for man, and those who, in obedience to the Divine command to keep it holy, have at some apparent personal cost and trouble endeavoured to do so, have always received a blessing.

The committee also feel that, as a matter of justice to our fellow-men, all possible efforts should be made to give them their day of rest.

In conclusion, your committee desire to express the pleasure it has afforded them to be engaged in so good a work as both the questions entrusted to their investigation, and, in resigning their trust, express the hope that their labour in either case will not have been in vain.

G. LIVESEY, Chairman.

Mr. J. CHURCH moved—"That the best thanks of the meeting be given to the committee for the elaborate report just presented, and for the careful and searching investigation given by them to the subjects referred to their consideration."

In doing so, he said he was sure the importance of the questions dealt with in the report were fully recognized by every member of the association, and that every one would readily appreciate the labour bestowed by the committee on their examination. With regard to Sunday labour, no doubt much might be done to reduce the amount, but he did not think any general rule could be laid down which would meet every case. Circumstances were so materially different at different works that it must be left very largely to the judgment of those who had the control of matters to decide what could or could not be done, in their respective cases, to give that relief to the workmen which all would acknowledge was very desirable wherever practicable.

Mr. NEWALL seconded the motion.

Mr. DENNY LANE (Cork) said he should like to be informed whether, in reference to the formation of a benevolent-fund, the committee had sought the co-operation of the gas companies as well as the managers of gas-works. If no such step had hitherto been taken, he thought it was a suggestion worthy of consideration whether the companies might not be asked to aid in the establishment of a fund for the relief of members of the profession who were reduced to circumstances of distress. The amount of property invested in the gas undertakings of the kingdom was so great, and the number of persons interested so many, that a very small contribution from the shareholders of the different companies would make a very important addition to any fund which might be raised among the members of this association. He was quite sure he could answer for several companies that, if proper applications were made to them, they would be quite willing to contribute something towards such a fund. There were many cases in which men engaged in gas-works—skilful and industrious men—had been struck down by illness before they were able to make a sufficient provision for their families, and he was convinced that the claims of such unfortunate individuals to help would be readily recognized by those who sought in gas undertakings the profitable investment of their capital.

Mr. J. CHURCH said it occurred to him that the first duty of the meeting was to pass a vote of thanks to the gentlemen who had acted on the committee, and whose report clearly indicated the large amount of care and thought they had bestowed upon the subject. This would not interfere with the after discussion of the question whether any and what other step should be taken in the matter.

Mr. WARNER thought there might be some difference of opinion with regard to the report itself. For his own part, he felt that the two subjects had not received an equal amount of attention at the hands of the committee.

Mr. J. CHURCH said it would be for the meeting to determine whether or not the committee had arrived at sound conclusions, but that thanks were due to them for their services could hardly be disputed.

Mr. D. LANE said in the observations he had offered he had no desire whatever to oppose the vote of thanks. The point to which he had referred seemed to be an important point, and he was desirous to know whether the committee's attention had been directed to it. He thought this was the proper way to raise that question.

Mr. G. ANDERSON said there was nothing wrong in so doing. Although the committee had performed an important, it was not a very arduous duty. It had been the custom of the association to include in one vote, at the end of their proceedings, their acknowledgments to all the gentlemen who had employed their energies in advancing the objects the members had in view, and he did not see anything in the present report which should induce them to depart from the previous practice of the association. The discussion of the general question might, therefore, very well proceed without any reflection upon the committee.

Mr. G. PARKINSON (Birmingham) said the only question raised by the motion was whether the committee should receive a vote of thanks for their services or not.

Mr. WARNER thought it was the duty of the meeting to thank the committee for their elaborate report on one of the subjects referred to them, but he could not agree to do so with regard to the other, for he did not think they had dealt with the question of the benevolent-fund as they should have done. On the Sunday labour question they had presented a most valuable document, which no doubt would help materially to reduce the amount of Sunday labour in gas-works; but that was an inquiry which emanated from a member of their own body, whereas the other did not, and he contended that the two subjects had not received an equal amount of attention at their hands. If the committee had propounded some plan for creating the nucleus of a benevolent-fund, the meeting could not have thanked them too heartily; and, considering that the association had now a large balance of funds in hand, the question of appropriating a portion of those funds to such an object might very fairly have been entertained by them.

Mr. OHREN differed with Mr. Warner on this point. The committee had not much to elaborate a report upon. Out of communications sent to 300 members, they received only 92 replies, and one-half of these were not favourable to the formation of a benevolent-fund. It appeared to him that the report fairly embraced all that the committee had before them.

Mr. SIMPSON (Rugby) thought Mr. Warner's objections were altogether out of place. As the mover of the united reference, the committee desired to have Mr. Warner's assistance, but he did not accept their invitation to attend. It was, therefore, somewhat unfair now to cast reflections upon them.

Mr. WARNER said the committee prepared a plan of their own, and issued circulars before they sent to him.

Mr. JONES rose to order.

The motion was then put, and carried *nem. con.*

Mr. J. WOOD (Bury) acknowledged the vote on behalf of the committee. In doing so, he said he felt it his duty to allude to the remarks made by Mr. Warner, and to assure him and the meeting that both the questions referred to the committee were fairly dealt with. In the one case a very large proportion of the replies were in favour of a certain course, in the other the minority were favourable to the views entertained by Mr. Warner. The committee, as representing the members of the association, were bound to report the suggestions and opinions received, and they had done so to the best of their ability. He was extremely glad that their labours were appreciated by the association, and on their behalf he expressed his obligations for the vote just recorded.

The reading of papers was proceeded with.

Mr. W. J. WARNER read the following paper:—

ON THE BEST FORM OF CONDENSER.

To no better subject could the committee have drawn the attention of this association than to "the best form of condenser." To none has so little apparent thought been given, and to no part of the manufacture of gas is so little heed paid as that of condensation. The chemical manufacture of a subtle, complex, elastic fluid, that in quantity and quality is materially affected by temperature, is carried on in many works without even the means of ascertaining what the temperature of the gas may be, and without any arrangement for controlling or regulating the same. Can there, then, after a moment's consideration, be the least surprise that such varying results are obtained in both quantity and quality, even in the same works, with the same description of coal at different periods, much less in various places, and by different men? Or what can be said for the item, "Unaccounted for," differing so in various towns, but that, while no attention is paid to the temperature at which the gas is *said* to be measured, it is like the "Fuel account" kept in some works—a snare and a delusion.

By "the best form of condenser," it is presumed that the committee meant—Upon what principle ought the refrigeration of gas to be carried on? Should it be by direct atmospheric influence, or by the intervention of another fluid? Though Mr. Lewis Thompson says little, it is believed, about the condenser, yet in a paper on Wright's "Ventilating Condenser," published in 1852, in the JOURNAL OF GAS LIGHTING, it is said, his "original and elaborate investigations have proved that while the hydrocarbon vapours contained in Newcastle coal gas at 60° have a specific gravity of 3·2, those of Boghead cannel gas are only 1·21, and in Wigan cannel gas 1·77, and that the former begin to be precipitated at a higher temperature than the two last. The safe-condensing minimum must, consequently, BE REGULATED by the nature of the material employed in the manufacture of the gas; therefore "*a perfect condenser must,*" it is added, "*allow of its cooling power being varied according to the temperature of the external air, and the quantity of gas passing through it.*"

In replying to the committee's circular, with list of suggested subjects for papers, it was to this point that I proposed principally to direct the attention of the members of this association in what could only be a very hurriedly prepared paper. How, then, has this principle been carried out, so plainly laid down 20 years ago? Malam had previously adopted the principle by the arrangement of the submerged condenser, and allowing water to flow through and amongst the condensing-chambers, and so could control the temperature of the gas. Our esteemed friend, Mr. Livesey, has a condenser in operation, too, I believe, upon the same principle. Another arrangement, having the same object in view, is that of water trickling over the air condenser. The same thing was proposed to be done in another, but certainly not more simple way, though patented—the application, by mechanical means, of wetted surfaces to the condensers, and so cool by evaporation. In the annular or ventilating arrangement there is but a partial regulation, which is due, not so much to the power of ventilation proper, or a strong current of air passing through, as to the power of lessening or increasing the surface to the action of the atmosphere. Mr. Kirkham was the first to apply this principle, and Mr. Wright's is a modification, which is identical with a refrigerator patented some years previous by a brewer—connecting-pipes being employed to conduct the gas from the top of one column to the base of the next, that the gas may always enter in this order. I here take the liberty of introducing three experiments, which were published in the paper referred to.

Experiment No. 1—passing 10,200 feet per hour.
Air, 54°.—Damp and cloudy.—Covers on ventilating-pipes.

	Inlet.	Col.1.	Col.2.	Col.3.	Col.4.	Col.5.	Col.6.	Col.7.	Col.8.
	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.
Temperature of gas	107	94	84	76	69½	64½	60	57	54½
Decrease in each column	—	13	10	8	6½	5	4½	3	2½
Accumulated effect of the successive columns	—	—	23	31	37½	42½	47	50	52½

Experiment No. 2—passing 11,120 feet per hour.
Air, 49°.—Fine and dry.—Covers off ventilating-pipes.

	Inlet.	Col.1.	Col.2.	Col.3.	Col.4.	Col.5.	Col.6.	Col.7.	Col.8.
	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.
Temperature of gas	100	78½	16½	59½	55½	53½	51½	50½	49½
Decrease in each column	—	21½	12½	7	4	2½	1½	1	1
Accumulated effect of the successive columns	—	—	33½	40½	44½	46½	48½	49½	50½

Experiment No. 3—passing 12,400 feet per hour.
Air, 55°.—Rain.—Covers off ventilating-pipes.

	Inlet.	Col.1.	Col.2.	Col.3.	Col.4.	Col.5.	Col.6.	Col.7.	Col.8.
	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.
Temperature of gas	103	79	67½	61	58	56½	56	55½	55
Decrease in each column	—	24	11½	6½	3	1½	½	½	½
Accumulated effect of the successive columns	—	—	35½	42	45	46½	47	47½	48

It will be observed, though it may appear remarkably strange to some, that there is really no practical control over the temperature shown by these experiments; thus—

No. 1. Covers on, column 8, temp. 54½, air 54
,, 2. Covers off, ,, ,, 49½ ,, 49
,, 3. ,, ,, ,, 55 ,, 55

Now, for the condenser to have answered to the principles laid down, it should have been shown that the gas could be maintained at a standard temperature, with varying makes and varying atmospheric temperatures—that the gas could be kept either below, at, or above the air. This, it is obvious, however, cannot be done with an arrangement in which the air alone, directly, is the cooling power. Before leaving this—the air condenser—I may add that Mr. Wright's connecting-pipes have been applied in duplicate, with other modifications, by Mr. Paddon; and in an arrangement of my own, I connect at the base by a short connecting-piece, and carry up a midfeather or partition near to the top of the annular chamber, and at the bottom the partition is sealed, and so there is a free way through from end to end for gas and fluids. Mr. Holmes, of Huddersfield, uses also, I believe, the partition, but I am not acquainted with the details.

In the high thermometrical absorbent power of water we have the means, and in the refrigeration of it the power to maintain the gas at any given temperature; and from the quantity of water that is used for washing and scrubbing, these two separate processes—condensing and scrubbing—may well be conducted at one operation; and with a scrubber constructed upon the principle described at the last meeting of the association, no difficulty could arise from stoppages. In this view of the case I am considerably supported by the paper of Mr. Cleland, recently published in the JOURNAL OF GAS LIGHTING. But the idea was practically carried out long since. The first of the two new scrubbers set in action at South Shields was placed before the condensers, and though these were scarcely powerful enough in warm winter weather with the heaviest make, since the scrubber has been in action half the condensers have been thrown off, and the long connecting-pipes of the scrubber have been jacketed in, and the entire upper portion of the condensers I am now having covered in, so as to protect them from the cooling influence of frost, rain, and snow. The feed or liquor pipes I propose to arrange for refrigeration so that the temperature of the liquor may be maintained at that desired. The condensers are arranged in two sets, and may be worked either together or separate, and by means of a change-valve, which was constructed for me by the Messrs. Cockey, they may be worked from either end, and so under exhaust or pressure—that is to say, we can exhaust either through the condensers or directly from the retorts—an arrangement which we have occasionally found exceedingly useful. Upon some future occasion I may take up this subject again, and give the association what notes I may have upon it, and upon the relative positions of the condensers.

A good thermometer is much needed for condensers. That of Mr. Parkinson is a very neat arrangement, but the metal case does not stand well; the case would be better, too, if it were connected by a non-conducting plug instead of a metal one screwed into the condenser, and elastic; also if the conical metal plug of the thermometer were of a non-conducting substance.

I must now apologize for the very poor dish I have served up to you at this repast, at which there is such an abundance of good and nourishing fare.

Mr. G. ANDERSON said the condensation of gas was of course as necessary as that of whisky, which required to be brought down from the temperature of the still to that at which the liquor was used. He had found in his experience that the condensation of gas should take place progressively from the temperature of the retorts down to the temperature of the purifiers, and that it should not oscillate between them. The next consideration of importance was that it should not fall too low—perhaps not below 55° or 60°—and that any arrangement which protected it from the influence of frost was a good arrangement. A third point, not touched upon in the paper, was also worthy of consideration—viz., that it was improper to convey the warm gas immediately into the condenser exposed to atmospheric influence or that of cold water. This he stated

upon his own experience, and that of others. He found it best to begin his condensation by passing the gas through a pipe, which ran round the inside of the retort-house. This pipe was supported by brackets, which extended through the walls of the retort-house, and supported an external pipe along which the gas was afterwards carried. Its further condensation was then a very simple process. He was connected with two works, one which had been in operation forty years, and the other only five or six. In the former, they were sometimes troubled with depositions of naphthaline; in the latter, where the arrangement just referred to was adopted, of internal and external pipes in connexion with the retort-house, they had never known what naphthaline was. This he regarded as a very important matter, because where there was a deposition of naphthaline, not only was there the loss arising from the removal of carbon out of the gas, but also the trouble and cost of clearing it out of the pipes.

Mr. HODGSON JONES thought the effect of carrying the pipe round the exterior of the retort-house, as explained by Mr. Anderson, would be disadvantageous, as tending, rather than otherwise, to the deposition of naphthaline, unless it were in a trough of water. For a long time he had adopted the plan of carrying a large pipe round the inside of the house, for the purpose of gradually bringing down the temperature of the gas, and he had found it absolutely necessary, in warm climates, to adopt the practice of putting the condenser inside the house.

Mr. ANDERSON (Bath) said he had a condenser like that spoken of by Mr. Warner, but, being troubled with naphthaline, he asked his directors for increased condensing power. In carrying out his arrangement with that object, he erected a wrought-iron pipe 18 inches in diameter, and ¼ inch thick. This pipe, which was 100 yards in length, was laid upon girders entirely round the interior of the purifying-house. It was his belief that, to keep down naphthaline, the gas must not be cooled too rapidly. He had 12 pipes to his condenser, 6 of which were washed inside with ammoniacal liquor of 6° Twaddle, and he always took care that the crude gas was not of a higher temperature than the liquor employed, because if it were so, the ammonia was extracted from the liquor by the gas. The exterior of the condenser was shielded from the sun by a tarpaulin, over which a stream of cold water flowed, because, being ¾ inch thick, the pipes absorbed a great amount of heat. The gas then passed through two scrubbers, where it was washed with liquor of 6° Twaddle. Afterwards it passed through the washer, care being taken to keep up a perpetual motion of cold water. He was proud to say that he had not cleaned out his gasholders for twelve months, whereas previous to adopting his present plan he had to examine them every three months.

Mr. WARNER said he had adopted the plan spoken of by Mr. Anderson, of carrying the crude gas round the retort-house, and he believed most gas managers had done the same. From inquiries made at the Liverpool works, he ascertained that Mr. Cleland's arrangement answered exceedingly well. His process of cooling the gas was somewhat analogous to the ammoniacal liquor pouring down through the scrubbers. Of course the temperature of the liquor was entirely under control, and the cooling of the gas was progressive.

Mr. CHURCH remarked that many present were aware of the improvement effected by the system referred to by Mr. Anderson, of carrying the pipes round the inside of the retort-house. There was one point in regard to condensation which had not been mentioned, and which it was desirable to keep prominently in view—viz., the importance of keeping the gas and tar in contact as long as possible. He believed it was the best mode of preventing the deposition of naphthaline, and, as far as his experience went, there was no better way to improve the quality of the gas. By carrying a pipe round the retort-house, as suggested, that temperature was preserved which was most calculated to retain the tar and gas together.

Mr. PHILLIPS (St. Alban's) had tried almost every description of condenser, and found the system in use at his present works the most effective. The pipes were carried all round the house, then through the middle, and afterwards there was a coil of pipes underground, the length of which he could vary by means of valves. Since this plan was adopted, he had never been troubled with naphthaline, and the quality of his gas generally had been improved.

Mr. R. H. JONES said at the new works at Dover the pipes were carried outside the retort-house on the sunny side. The two works in that town were a couple of miles apart, but were married by a main. At his private house, which was situated midway between the works, he could always tell, by the illuminating power of the gas, whether the supply was from the new or the old station.

Mr. D. LANE said that Mr. Lewis Thompson pointed out the necessity of avoiding over-condensation as well as under-condensation. He stated that at the ordinary temperature at which gas was consumed it carried with it a certain proportion of hydrocarbons, which would be condensable at a lower temperature. Those hydrocarbons had a specific power to hold naphthaline in mechanical suspension. If the temperature was too high more naphthaline left the condenser than the other hydrocarbons had power thus to retain. On the other hand, if it was too low, the result was that the other hydrocarbons themselves were also condensed, and the naphthaline could no longer be held in suspension. Every gas engineer who had had much experience was convinced of the fact that the longer the gas was kept in contact with the tar, the freer would it be from naphthaline, and the higher its illuminating power. The remark made by Mr. Warner respecting the mode of regulating temperature had not been sufficiently noted. It appeared well worthy of consideration whether some automatic arrangement could not be used which would keep the gas up to a certain temperature. With the condensers at present used the gas varied very much in temperature, according to the season of the year. There was surely some particular temperature which was best calculated to prevent the deposition of naphthaline, and retain the highest illuminating power of the gas. In none of the condensers he had seen was there any real automatic arrangement of the kind designed, and gas managers would do well to direct their minds to the subject.

Mr. HARTLEY (Westminster) said Mr. Warner had expressed a wish to have a non-conducting thermometer which should not take the heat from the condensers. It seemed to him that this was a matter very easily accomplished. Nothing more was necessary than to plug the column with a block of wood, and interpose a medium which would prevent the thermometer taking the heat from the metal.

Mr. WARNER said he had adopted that plan, but it was always failing. He did not know whether the members had seen Mr. Parkinson's arrangement, which was an extremely neat one. First of all, there was a very thin casing of white metal soldered to the screw-plug screwed into the condenser itself. The plug which went into the condenser had a ground conical seating for another plug to fit into, so as to make an air-tight joint. To this cone there was attached a thermometer, which, when placed in its position, was, of course, excluded from external air, and conveyed the temperature of the gas through the metal casing. He had given this arrangement a long trial, and had found it very useful.

Mr. JOHN SOMERVILLE (Dublin) read the following paper:—

ON THE CAUSE AND PREVENTION OF CHOKED ASCENSION-PIPES.

There is hardly any matter in the daily routine of a gas-work which causes so much trouble and annoyance as stopped ascension-pipes. They are a constant source of anxiety in the retort-house, as they are also a constant source of expense and waste, and happy should be the man who can say he is not much troubled with them. We know there are such cases, but they are rather the exception, not the rule. Where iron retorts are employed, and where cannel coal is largely used, the stoppage of ascension-pipes is almost unknown.

When coal is distilled in hot retorts—that is, retorts at a bright red heat, which is the best heat for the economical production of gas—towards the end of the charge the gases are given off at a much higher temperature than at the first part; this high temperature is communicated to the ascension-pipe by the gases, by transmission from the mouthpiece and by radiation from the brickwork of the bench, and all the condensation which ensues consequent upon a change of temperature from the retort to the ascension-pipe, as it flows down the interior of the pipe, is robbed quickly of its volatile properties, while the carbonaceous part of the condensation as quickly adheres to the surface of the heated iron and accumulates, which, when once formed, collects rapidly, as every addition to its thickness acts as a conductor of heat, until it soon closes the pipe, requiring the application of the auger to force a passage; and soon even that ceases to have effect, when chisel bars must be used from the top while the retort is laid idle.

We are all familiar with the fact that in a setting of seven retorts, the centre one directly over the furnace, which is usually the hottest, is always the one to give the most trouble by the frequent stoppage of the ascension-pipe. This is partly avoided in some works by charging the middles every four hours, while the others are charged every six; and when circumstances will admit of this being done, it is the best method of robbing the retort of its excess of heat, and thus preventing in a great measure frequent stoppage.

The accumulation of carbonaceous matters are deposited in a very uncertain manner, not always in the same place—sometimes near the mouthpiece, sometimes in the dip-pipe, another time in the H or bridge pipe, but generally half way up the ascension-pipe, opposite the top row of brickwork of the bench downwards to the mouthpiece; and in the case of double or through retorts, with two ascension-pipes, the stoppage takes place in one of the pipes only, then in the other, and thus alternate with every change of wind.

There are some substances which it is nearly impossible to distil for gas-making without choking the ascension-pipe in a short time, whatever precautions may be taken—such as Trinidad bitumen, cotton-seed pitch, and materials of that class, which, as soon as subjected to a heat proper for their decomposition into permanent gas, give off their gases so rapidly, which on arriving at a slightly lower temperature condense so quickly, that it is found almost impossible to use them, owing to the frequent stoppages of the ascension-pipe, or to distil them at such a temperature that it is questionable whether they are converted into gas at all; but as this class of material is not very generally used, and for the reasons given not likely to be, they may be dismissed from our consideration.

Various expedients have from time to time been resorted to, in order to overcome or prevent stoppages in the pipes; but none, as far as I am aware, have been completely successful. We are all familiar with the plan of placing a few shovelfuls of wet coal under the ascension-pipe before closing the lid after charging the retort, or placing there an iron vessel filled with water, or an old scoop or piece of iron placed between the brickwork of the bench and the troublesome pipe; and probably some of us may have tried the suggestion, published some time ago, of adding to every charge so many pounds of rock salt or so many pounds of soda. Some of these may do no harm, but effect as little good. They are troublesome at the best, and the pipe will continue to stop after all these means have been tried. Some method of keeping the pipes cool (as the whole source of the evil under consideration is hot pipes) becomes the paramount desideratum in preventing the nuisance.

To prevent the radiation of heat from the brickwork of the bench, the transmission of heat from the iron mouthpiece and the prevention of the flame acting upon the pipe during the time of drawing and charging are the three means to be employed for prevention and cure.

First, with regard to the radiation from the front and top of the bench. Retort-benches should be built up from the foundation, having a front wall at least a brick and half thick, and having three rings of brickwork forming the arch, four courses of brickwork above the rings, then 6 inches of fine sand, and paved with brick on edge well grouted in. This will effectually prevent radiation, both to pipes and hydraulic main, and enable workmen to walk about without burning the soles of their shoes; it also conduces to a saving of fuel by retaining the heat within the bench for the benefit of the retorts instead of its being wasted in the atmosphere.

The iron mouthpiece attached to the clay retort, whether by socket or flange, should not be less than 15 inches deep, having the socket for ascension-pipe as near the front as possible, leaving at least 6 inches between the pipe and the brickwork. The mouthpiece should be cast as thin as is consistent with strength and durability, and the ascension should also be as thin as possible, half an inch thick being quite sufficient, and should not be less than 6 inches internal diameter for the regular-sized retort of 10 feet long and 15 inches diameter, for shapes, whether ⏢ or oval, having the same superficies. This size should be continued through the H-pipe to its down-leg, and then may be contracted to 4 inches with a 4-inch dip-pipe passing into the hydraulic main, and the dip-pipe should not be less than 6 inches clear of the bottom of the main.

The hydraulic should be raised at least 3 feet from the top of the brickwork, and should be of a square shape, as giving more area than a round one at the bottom for any accumulations that may be deposited, and the action of the gas issuing from the dip-pipe tends to send any deposit into the angles instead of remaining directly under the dip, as in a round or U shaped main.

A shield, fender, or flame plate is also a great protection. This should be made of 8 or 10 gauge sheet iron, and placed above the mouthpiece, and resting on them, and cover the width of pipes and be four or five feet high, and held at an angle of 35° from the ascension-pipe. This deflects the flame from the pipe during the process of drawing and charging, and also establishes a current of air through and among the pipes.

In my experience these are the best means and arrangements for preventing, as far as possible, the choking of ascension-pipes. A plentiful current of air circulating freely through and among the H-pipes and along the hydraulic main from opposite openings in the walls of the retort-house, prevents stoppages in the H or dip pipes, and also prevents the tar getting thick in the main. So that retort-houses should always have abundance of openings in the upper parts of the walls.

Doubtless, if ascension-pipes were cast double, or having a jacket surrounding them with a constant circulation of water or air from top to bottom, that stopped pipes would be unknown; and also if a piece of non-conducting material, a foot in length, attached to the mouthpiece and the ascension-pipe leading from it, could be introduced at moderate expense, it would tend greatly to diminish the transmission of heat from the one to the other.

I have been induced somewhat hurriedly to throw these remarks together, more for the purpose of eliciting discussion on the subject than from the consciousness of conveying anything original to the members of the association, feeling at the same time convinced that the matter is one of sufficient importance to engage the attention of gas managers, if only for the purpose of ameliorating the arduous duties attached to the retort-house, of improving the temper of the stokers, and in causing their asseverations to be somewhat milder against stopped ascension-pipes.

Mr. HODGSON JONES said he had had to deal with a great many works in which the disease of stopped ascension-pipes had become chronic, and he had never failed to provide a remedy. At the present time he had about thirty gas-works under his hands, and hardly such a thing was known in any of them. The means he adopted were somewhat similar to those which Mr. Somerville recommended. He had usually found the evil arose from the fact that at some point in the old works there was an undue pressure thrown back upon the retorts at different times, and the means employed to overcome the evil was to give plenty of way to the gas to get freely off from the retorts. He had used

for this purpose a 6-inch pipe at the bottom, reduced to 4 inches at the top, with 10 inches clear space from the front of the beds to the ascension-pipes, and about 3 feet to the inside of the arch, with another 2 feet to the support of the hydraulic main. He might mention that the hinged pipe was one commonly in use—simply an angle bend falling in the direction of the retorts; where in one or two cases they had been fixed by error in the other direction he had had stopped pipes, but the moment they were reversed the evil ceased. Another precaution against stopped pipes was to have varying levels for the tar, and never to put more than four beds on the hydraulics, so that the level of the tar might be adjusted to the level of the dip-pipe.

Mr. Warner thought Mr. Somerville had properly hit off all the essential points. One of them—that of the importance of a larger surface at the bottom of the hydraulic—was a very happy thought, and was so very simple an expedient, that it was a wonder no one had ever thought of it before. He had never himself seen it carried out, but he thought it ought to be. Again, with regard to Mr. Somerville's non-conducting connexion between the mouthpiece and the ascension-pipe, there did not appear to be any difficulty in carrying out the arrangement, and it was one well worthy of a trial. There was one thing Mr. Somerville might have touched upon in speaking of stopped pipes, and that was not the arrangement of the apparatus itself, but the working. He thought this had something to do with it. If charges of small coal were thrown into very hot retorts, so as to give them a light centre charging, the hot gases came over very quickly, and carried with them a large portion of small coal into the ascension-pipe.

Mr. Baker (Limerick) said he believed the evil of choked ascension-pipes was greatly owing to the dip-pipes not being of the same length, and therefore being differently sealed. This often occurred in old works where, when new beds were set up, there was not the same dip. The draught was greater on those retorts which had the longer dip, and the heated air drawn from the surface of the retort into the retort itself heated the gas very highly. For his own part he did not know what it was to have a choked ascension-pipe. He had followed the plan of dividing his beds at the back of the hydraulic main—*i.e.*, he had three lengths of hydraulic main divided by diaphragms, so that the liquor shall just flow over the surface. At the back of each he had inserted a valve, and when the beds were set to work by turning a screw the valve sank down. The normal seal was 4 inches, and this he reduced to 2 inches—every bed not at work he sealed at 4, and every one at work at 2 inches. He was very careful to set the dip-pipes at the same level, chipping off the lower edges of some so as to make the seal in every case the same. In an old retort-house he had found that with the variation of a quarter of an inch the ascension-pipes choke very much. If it were not for this precaution, as he worked at high temperatures he would often experience the annoyance now under consideration. As it was, he was enabled to make a large quantity of gas of good quality, and to escape the trouble with which the paper dealt.

Mr. Church said if certain well-known principles were carried out, choked ascension-pipes would be unknown. He took it that the essentials were large ascension-pipes and a large hydralic main, the former placed at a greater distance from the brickwork than had usually been done. With reference to the form of the hydraulic main mentioned by Mr. Somerville, he thought much might be said in its favour. He had himself used hydraulic mains, not quite square but rectangular. They were rather more expensive than round, but this was not of much consideration in constructing works. With attention to these details gas managers need not be much troubled with choked ascension-pipes. It was entirely a question of temperature and size.

Mr. Ohren said at the last meeting of the association he stated in his address that at the Crystal Palace District Gas-Works they had had great difficulty with their through retorts. They found, on one occasion, that the pipes were stopped on one side, while those on the other were passing gas; and, on examination, it was discovered that there had been a sinking on the former, which had increased the seal of the dip. He thereupon introduced a system for regulating the level of the water in the hydraulic main, and equalizing it on both sides, since which he had had no stopped pipes. He took out a patent for this process, but had not done anything with it.

Mr. G. Anderson said his experience was that it did not matter what was the size of the pipes, for under certain circumstances and conditions they would always become stopped. He had had 7-inch pipes stop as well as 4-inch. He believed it was a matter of heats only, and that size had nothing to do with it, for whatever the size might be, it was simply a question of a longer or shorter time being required before the pipes became stopped. There was great force in what Mr. Baker said, and he (Mr. Anderson) made a similar statement at a previous meeting of the association. By over-working the exhauster, if the retorts were at all out of order, the air would be drawn from the interior of the furnace, and hot air would be sent into the interior of the retorts, which might contain enough oxygen to effect combustion. He had seen 10 feet of pipe completely blocked up with a mass of carbon, in the interior of which were holes containing pure soot. He contended that this pure soot could not have got there except by the action of combustion. Care must be taken that the level of the water was equal on each side, and that the exhausters were worked at such a vacuum that no risk would be run of drawing hot air into the pipes. A year or two previously he had to remodel some works in Ireland, and not wishing to incur more expense than necessary, he adopted the existing 3-inch pipes, although he considered them too small. Experience, however, had shown that they were sufficiently large, and confirmed his belief that it was not a question of size at all, but of heats.

Mr. G. Anderson read the following paper:—

ON THE BENEFITS ARISING FROM THE USE OF EXHAUSTERS.

When gas was first introduced into these islands for lighting purposes, both chemical and mechanical science were so little understood that exhausters were not felt to be necessary. At that time gas only superseded whale oil and tallow candles, neither of which were salubrious or satisfactory lights.

Although the gas was not very pure, it gave a better light than these substances, and being mostly employed out of doors for street lighting, or in workshops, its impurities were not much felt; but as it got introduced to the dwellings of man, and there had to compete with the finer oils and wax candles, its impurities would become intolerable, and this would lead to its improvement or better purification.

But this extra purification cannot be effected without increasing the pressure within the pipes and also the retorts. Again, the Scotch, who have been the greatest pioneers in gas manufacture, discovered that earthenware retorts were better for their purpose than iron ones (which were the first employed); but as earthenware is more porous than cast iron, the pressure within the retorts caused them to leak a considerable quantity of the gas, and I have known earthenware retorts abandoned and cast iron ones resorted to again for this cause alone.

But the immediate cause which led to the introduction of exhausters was the large amount of carbon which Mr. Grafton found to form in the interior of his retorts, which led him to make a number of experiments, because, as he states, "after consulting the most eminent scientific authorities," they did not, to his mind, satisfactorily account for the evil. As I think it will be interesting to many gas managers to have these experiments described, I will quote Mr. Grafton's own language.

Mr. Grafton says: "After a series of experiments, established in 1839, at the Cambridge Gas-Works, and after having in vain offered a large premium for the discovery, I was myself enabled to detect the origin of the great accumulation of the carbonaceous deposit in coal gas-retorts, as well as the means of obviating an evil which has been the source of so much loss to the manufacturers of gas. Previously to that period the most eminent scientific authorities consulted on the subject considered this accumulation as the result of high degrees of heat, and too great an extent of heated surface.

"To ascertain how far this opinion was correct, I commenced my experiments with a number of retorts reduced to various lengths, by the ends being filled up with brickwork, the other dimensions remaining unaltered.

"By this difference of length, after repeated trials and at various temperatures, the deposit did not appear to be diminished, although it did not accumulate so rapidly, and finally it formed a coating of the same substance, not less in a short retort than in a long one.

"It was observed in all cases that the substance began to form itself first at the closed end of the retort, whence it gradually advanced, and accumulated in bulk; at that end the coal (especially with cylindrical iron retorts) is carbonized first. Hence the inference is that the best constituents—viz., the hydrocarburets—being without the means of escaping, become decomposed, leaving as a result the carbonaceous deposit.

"I then had two retorts constructed, with an ascending pipe to carry off the gas at each end, so that its stream might divide itself into equal portions each way, thus reducing the passage over the heated surface from 7 feet (the length of the retorts) to 3 feet 6 inches, and affording equal means of escape to the gas from all parts of the coal. The deposit, after three months constant working, was considerably less at the closed end of the retort, but it formed itself in the same quantities on the roof, and soon covered the whole of the inner surface, gradually, as heretofore, diminishing the capacity of the retorts, and increasing the consumption of fuel.

"The resistance offered to the gas during these experiments by the purifiers and the weight of the gasholders was equal to a column of water of 9 inches by the gauge on the mouthpiece, this pressure having varied by the alteration of the weight of gasholders between winter and summer. I remarked that the accumulation was not so rapid in the summer months, when the resistance was less and the gas less compressed. I immediately had the pressure increased to a column of 14 on the gauge, keeping up the usual heat. The retort for this experiment, like all the rest, was constructed of fire-bricks of the oven form—7 feet 9 inches long, 5 feet wide, and 16 inches deep—capable of holding and carbonizing 130 lbs. of coal every hour, or 7 cwts. in six hours. At the end of the first week the deposit appeared about an inch in thickness, and when once formed it accumulated more rapidly, till the whole inner surface within a foot of the mouth was covered with it. At the farther end it rapidly filled up the retort, preserving an equal thickness, until, at the expiration of two months, it had reached 24 inches in thickness, stopping up the retort quite one-fourth of its length; under the roof and upon the sides of the remaining portion of the retorts, it formed a coating of not more than 2 or 3 inches thick; in four months more it would have filled up the whole.

"We then had the substance cut through into two parts and taken out, when, after allowing for some of the scattered fragments, it weighed full 10 cwts. 24 lbs. The coal carbonized, during the time of this experiment, was 67 tons of Woodside Wallsend—the same having been used in nearly all the former trials—the deposit, therefore, was in weight about $1\frac{1}{5}$ per cent. of the coal carbonized, *and undoubtedly occasioned by the compression of the gas in the retort* immediately after its formation.

"I have applied myself to the means of taking off the whole of the pressure, which I effected, excepting only the resistance offered by the half-inch dip in the fluid of the hydraulic-pipe, under this change of operations. After the same retort was again worked with the Woodside coals without interruption for four months, I had the satisfaction of observing that scarcely any deposit appeared at the expiration of that time.

"If I mistake not, this will prove a welcome discovery to all gas companies, more especially to those where the Newcastle coal is used."

The first machine that Mr. Grafton employed for sucking the gas from the retorts was a common wet gas-meter, and to make it serve a double purpose, he made also a wet lime purifier. An exhauster of this kind I saw at the Hague some 22 years ago, but from the difficulty of getting the hoods of the drum to overlap far enough to resist high pressure, and also from the large amount of power it required to drive it, this form of exhauster never became extensively used.

It is not my intention to introduce into this paper any description of the numerous forms of exhausters, for two reasons—first, I was asked by the council to prepare a paper on the benefit arising from the use of the exhauster; and, second, because I am interested in the sale of an exhauster that bears my name, and I do not want to make the society a medium of puffing things in which I am financially interested. I thought it well, however, with a description of the introduction of the principle, I might mention the simple, beautiful, and ingenious manner in which Mr. Grafton accommodated his means to his wants, and paved the way to one of the most important mechanical appliances that has occurred in gas manufacture.

Although the incrustation of carbon upon the interior of the retort was the fact that led to the use of the exhauster, the removal of that is by no means the chief advantage that has been found to arise.

By removing the pressure from the interior of the retorts, we are enabled to use purifying apparatus, such as washers and scrubbers, all which tend to increase the pressure; but as the exhauster is fixed between those vessels and the retorts, and the gas is sucked from the latter and forced through the former, we can have from one to two inches of vacuum on the side of the exhauster next the retorts, while there may be a pressure, as there is in some cases, of 36 to 40 inches on the other side, which, in the absence of the exhauster, would all be thrown upon the retorts.

We are also able to use heavier gasholders of the telescopic form, in which with their tanks there is a saving of 30 to 40 per cent. of money, as well as in the land employed for their use.

It also follows that retorts last much longer when the pressure is removed. When they have been at work a year or two we sometimes find a piece drop out; we repair this by putting it in again, or it may be by putting in a piece of fire-brick, and finishing with stiff fire-clay, and, as there is no pressure in the retort, this makes a good repair of a retort that, without an exhauster, might be useless, or, if not entirely so, would be so leaky as to waste a large proportion of all the gas generated in the retort.

It also follows that, from the lesser formation of carbon on the interior of the retorts, not only is there, upon an average of cases, 10 per cent. more gas made per ton of coal, but the retorts are more easily and uniformly heated, and that with a smaller amount of fuel.

It follows also that the men find it much easier to put on the retort-lids, and, when on, they are more likely to be gas-tight than where there is a strong flare, that both hinders the men and frequently blows off the luting.

On the question of money advantage, Mr. Cockcroft, the engineer of the gas company of Littleborough, favoured me with his experience of six months before and six months with the exhauster, as follows:—

Without Exhauster.

Date.	Gas Produced. Cubic Feet.	Coal and Cannel Carbonized. Tns. Cts. Qrs.	Av. Produce of Gas per Ton of Coal and Cannel. Cubic Feet.
October, 1866 . . .	950,400	104 5 0	9,116
November, ,, . . .	1,475,900	170 0 0	8,681
December, ,, . . .	1,721,900	197 12 0	8,714
January, 1867 . . .	1,582,500	187 10 2	8,440
February, ,, . . .	1,139,160	132 2 0	8,623
March, ,, . . .	750,210	86 19 2	8,680
Total . . .	7,620,070	878 9 0	8,674

With the Exhauster working.

Date.	Gas Produced. Cubic Feet.	Coal and Cannel Carbonized. Tns. Cts. Qrs.	Av. Produce of Gas per Ton of Coal and Cannel. Cubic Feet.
October, 1867. . .	1,123,940	114 18 0	9,781
November, ,, . . .	1,682,290	170 18 0	9,843
December, ,, . . .	1,946,230	198 9 0	9,807
January, 1868 . . .	1,777,150	182 9 0	9,768
February, ,, . . .	1,336,260	135 10 0	9,883
March, ,, . . .	812,490	88 4 0	9,191*
Total . . .	8,678,360	890 2 0	9,744

* Exhauster not working all this month.

I need not read the whole of the figures, which in each case are given monthly, but quote you the results.

Without the exhauster, the gas made per ton of coal was 8674 feet; with the exhauster, 9744 feet—being an increase of 12$\frac{23}{100}$ per cent.; and this increase would have been greater but for the fact that the last month of the six with the exhauster—namely, the month of March—the exhauster was not in action, so that we have one month of a low yield incorporated with five months of a higher yield—for instance, in the month of February, with the exhauster, the make was 9883 feet per ton of coal; whereas, in the month of March, without the exhauster, it fell to 9191 feet.

I think it better to give this explanation than to omit a month of Mr. Cockcroft's figures, but, for the purpose of arriving at the financial result, I must omit the month of March, in which the exhauster was not at work. One fact, however, I wish to point out, which, in my opinion, refers to the question of duration of retorts—namely, that without the exhauster the yield of gas was best at the beginning of the winter, and gradually became worse towards the last, the figures being—yield in October, 9116 feet; yield in March, 8680 feet; whereas, with the exhauster, we have October, 9781 feet, and February, the last month, the exhauster was, in action, 9883 feet.

To get at the financial results, I will suppose a consumption of 2000 tons of coals per annum, and the price of coal delivered 16s. per ton, from which members can make comparisons suitable to their own cases.

2000 tons of coal, with exhauster, producing 9844 feet per ton.

The average of the five months equals	19,688,000 feet.
2000 tons, without exhauster, at 8674 feet per ton .	17,348,000 ,,
Divided by make per ton, without exhauster, 8674— Difference	2,340,000 ,,
Saving	269 tons.
269 tons of coals, at 16s.	£215 4 0

To work out the problem, there should be added the extra duration of the retorts and the advantages named, and from it there should be deducted the interest on the capital invested, and the cost of fuel and labour driving the exhauster; but, as I think that the one may be set against the other, I take no notice of either.

Another advantage of the use of the exhauster is that if 10 per cent. more gas is made from the coal, there must be a saving of that amount in the labour account for stokers, and also in the capital necessary to be invested in retorts and retort-houses.

Another incidental advantage is that wherever an exhauster is employed we can get assistance from the steam-engine in driving pumps for tar, for liquor, or for the water necessary in the conduction of the works, which often saves the men much arduous work; and from the steam-boiler we get steam or warm water to clean out pipes or keep gasholders from getting frozen in winter.

I have never known a case where the men would, of their choice, abandon the exhauster, but I have seen them use every energy to get it started again when accidentally out of action; nor have I ever known a manager of gas-works wish to do without the exhauster after he had once had one, but I have known many have them in duplicate, for fear by any accident they should be a day without its use.

I have no hesitation in stating that it is nothing but the ignorance of the parties concerned in any gas-works using 500 tons of coal in the year, or even somewhat less, if they are without an exhauster.

And generally, wherever you find such, you will find badly conducted works, badly purified gas, few private consumers, little extension of the business, small dividends, frequent change of managers, from the quarrels that bad results always occasion between managers and their board of directors, and badly paid officers and servants, who correspondingly take little interest in the success of the works. But when you have an exhauster all these things are reversed, which I trust is the case already, or soon will be with the whole of you.

In large works it is usual to have a man to look after the engine and fire the boiler, filling up his time with other duties; but in works up to 3000 or 4000 tons of coal used per annum this is unnecessary. The stokers do it among them, and the fuel required is only the refuse from the ash-pans.

In conclusion, I ask the excuse of those members who already have exhausters, and know, perhaps, more advantages than I have named. This paper is not so much for them as for others who have not advanced to that stage of experience.

Mr. Miles said Mr. Anderson had quoted a place with which he was familiar —Littleborough—but he knew of another place, similar in all respects, which had an exhauster of the kind described, and the manager would be extremely glad to use it, but he could not realize the beneficial results which Mr. Anderson spoke about. He could make, as an average for the year, 10,900 cubic feet of gas per ton of from 17 to 19 candle power, with from 40 per cent. of Wigan cannel and 60 per cent. of Wigan coal, and that, too, without the use of an exhauster at all. Perhaps Mr. Anderson could explain how this was. There was no doubt that in large works exhausters were valuable, but the question was what were the smallest works at which they could be profitably employed. He could credit the statement that by their use the durability of retorts was increased, but whether to such an extent as to counterbalance the expense of working the exhauster he doubted. It had been said that the workmen were in favour of its use. Probably that might be so when no trouble was occasioned thereby, but in cases, of which there must be many, where the exhauster was necessarily placed at 60 or 100 yards from the retort-house, and the men were obliged, at all hours of the day and night, to go and look after the boiler and engines, he could scarcely believe they would be strongly prejudiced in favour of it. He would be glad to be informed how much longer retorts would last with an exhauster than without; upon what basis it was calculated that the make of gas was increased 10 per cent. by its use, and how it could be accounted for that such results had not been obtained in the works he had mentioned.

Mr. Craven (Dewsbury), in reply to the last speaker, said that, in works where the consumption of coal was from 500 to 1000 tons per annum, it would be worth while to employ an exhauster. In such a case as that supposed, where the exhauster was 100 yards from the retort-house, they must be large works, and therefore capable of profitably employing an exhauster. He had two works under his charge, and he found that if from any cause it became necessary to stop the exhauster at either end, the make of gas immediately dropped down, and it was the object of the manager to get it to work again as speedily as possible, because it was felt that the benefits of its operation were undeniable.

Mr. Fraser (Inverkeithing) said in the east and centre of Scotland there were no exhausters except in the large works, and yet in those places there were good management and good dividends, though underpaid servants. In the town of Dundee, under the old management, exhausters were used at the gas-works during the winter, but the expense was found too great in the summer, and they were then thrown out of action.

Mr. Broadhead strongly objected to Mr. Anderson's accusation of ignorance on the part of those who did not use exhausters. Last winter, with 86 clay retorts, he worked 74, and made from 220,000 to 225,000 cubic feet of gas per 24 hours without any exhauster. He worked at 6-inch pressure into the hydraulic, and stopped ascension-pipes he knew nothing about. During the last 20 years the works had yielded a profit of 10 per cent., and sufficient in addition to pay up all arrears since 1846, and to add recently £500 to the reserve-fund. In answer to several questions, he stated that the price of gas at Grimsby was 3s. 9d. per 1000 to the general consumers, and 3s. 6d. to the railway and dock companies, which paid upwards of £1000 a year for their supply. The parliamentary standard of illuminating power was 14 candles, but he gave 16 out of the works. All his works had been constructed by himself during the last 20 years. He realized about 8700 cubic feet of gas at the station-meter, and delivered something like 7500 feet to the consumers per ton of coal carbonized. The price of South Yorkshire coal, delivered at the works, was 9s. 2d.; his coke produced 10s. per ton, and he obtained 1s. per 100 gallons for his ammoniacal liquor. Such being the result of his working, he did not see the use of having an exhauster, and he did not consider himself exposed to the charge of ignorance while he thus continued to satisfy both his employers and the public.

Mr. Warner said he should like to have heard, in connexion with all the statements made, an account not only of the temperature at which the gas passed away from the exhauster, but also the temperature at which it was measured, and the condition of the meters employed. Meters—especially station-meters—were very troublesome things, and any figures might be got from them. He thought such high quantities of gas per ton of coal as had been quoted should not go unchallenged, but be accompanied with their qualifying facts.

Mr. Miles said his statement about 10,900 feet referred not to the station-meter but the consumer's meter.

Mr. R. H. Jones said his firm had three gas-works in Ireland where the consumption was from 300 to 450 tons of coal per annum. In two of these small works there were no exhausters; in the third, where the consumption of coal was the largest, an exhauster was employed; and he could state from experience, ranging over four years, that the make of gas there was 10 per cent. greater in proportion than at the other places, and this 10 per cent. had reference not entirely to the quantity shown by the station-meter, but the quantity sold to the consumers. The illuminating power of the gas in the latter place, and with reference to the question of the expense of fuel used under the exhauster, he might state that they simply used the waste which came from the ashpit and a few ashes quite unsaleable.

Mr. Darney said the consumption of gas in Faversham was about 16 million cubic feet annually, and though he was not ignorant of the use of an exhauster, he did without one from 1860 to 1869. During that period the concern was very prosperous, paying 10 per cent., but since they had begun the use of an exhauster they had been even more so. The exhauster cost £180, and the total expense, including some necessary alterations for pumping purposes, was £230. In the first year of its use they sold 250 chaldrons less coke, but against that was to be set the fact that they carbonized 180 tons less coal; while they sold 360,000 cubic feet more gas, which, at the current price, amounted to £90, and with the saving on the quantity of coals very nearly paid the cost of the exhauster. When first introduced, he had some doubt whether his men would be able to work it. They looked upon it somewhat as an innovation and a thing which would cause them additional trouble. Now they were just as proud of it as a girl with a new doll, and kept the engine as bright as silver, and the engine-room as clean as a new pin. As it pumped the water there was less work to do in the retort-house than before, and altogether he considered it a perfect success.

Mr. Church would have thought there could be no doubt in the mind of any gentleman present as to the value of exhausters—certainly there would not be with those who had had any experience in the matter. To his own mind, indeed, all that had been said on the other side rather enhanced his opinion of their value. Mr. Broadhead who, according to his own statement, had been so extremely successful without an exhauster, had only made 8800 feet of gas per ton of coal carbonized. He ventured to tell Mr. Broadhead that with an exhauster he would have made another 1000 feet. He knew many places such as Mr. Fraser had referred to, where they were working clay retorts without an exhauster exceedingly well, but he had no doubt that with its use they would show correspondingly better results. He had taken some trouble in the matter, and made several experiments to determine the value of exhausters, and had always found that 10 per cent. was about the increased quantity of gas made with any description of coal, and up to this extent there was no deterioration in the illuminating power of the gas produced. This was a very important consideration in estimating the cost of manufacture and production of gas. With reference to the size of works where exhausters became profitable or otherwise, he had found in his own experience that when the consumption of coal was about 1000 tons per annum, an exhauster might be used with profit. Probably on a smaller scale it might be so, but on that point he could not express an opinion. As to the cost of working, the foreman of the stokers where the make was from 15 to 20 millions per annum would look after the engine-house for an additional 1s. per week, and there could be no doubt the men did appreciate any machinery which reduced labour. The pumping of water in some works was often a serious expense, and the engine might be employed for that purpose. One point should be explained in reference to Mr. Fraser's remark—viz., that in the works he spoke of, cannel was used for gas-making, and there being less deposit from that material than from Newcastle coal, an exhauster was less needed. In some works in Scotland such a thing as a carbonaceous deposit was scarcely known even in ordinary short retorts, a circumstance with which he was much struck when visiting that country. All such questions as the one now under consideration must be reduced to finance; and viewing this in that way, and seeing that clay retorts would last one-third longer with than without exhausters, he thought there could be no doubt of the advantage of their employment.

Mr. Baker spoke in favour of the use of exhausters, and said at Limerick he had been using Londonderry coal for twelve months, from Earl Vane's pit, and had obtained from it 11,500 feet of gas per ton.

Mr. Warner, interrupting, said, when the quantity and quality of gas was mentioned, he thought the meeting ought to be informed whether it was tested periodically and by a public examiner.

Mr. Baker said the gas was tested by himself with Lowe's photometer, and was equal to 13 candles.

Mr. Warner asked what was the temperature of the gas at the inlet of the meter, and whether there was a self-regulating water-line to it.

Mr. Baker said there was not.

Mr. Warner inquired whether there was a gauge for the height of the water.

Mr. Baker said there was, and he saw after that himself. He worked high heats, and therefore could not get on without an exhauster. He had no fixed thermometer.

Mr. Warner said he doubted whether any other gentleman present could state that he was making that quantity of gas per ton.

Mr. Foulis said at Glasgow exhausters were employed. Referring to the remark made by Mr. Church, he said there was a deposit with cannel coal.

Mr. Anderson said he had very little to say in closing the discussion, as the speakers had answered each other. On the whole, the balance appeared to be in favour of those who advocated exhausters, and he had no doubt that those who

were now making 9000 feet of gas per ton without using them would find a satisfactory increase of production by their employment. As to the time which retorts would last longer with exhausters, the figures which he had given were very satisfactory. And it followed really from the exercise of judgment in the matter, that, if there was no pressure inside an article, it must wear longer than with such pressure existing, especially with an article like a retort, which was in a highly heated state during the whole of its active life. No doubt Mr. Broadhead was very successful in the results he had given, but it was questionable whether any other man could do the same, and even he would have been more successful with an exhauster. Mr. Darney proved that he obtained more gas and a better money return with than without an exhauster. As to Mr. Cockeroft's figures, he took them as he found them; but he could personally confirm what Mr. Jones had said—viz., that at their own works they made 10 per cent. more gas with identically the same coals where the exhauster was employed, and the gas was of better illuminating power, and of course better purified, because they were able to use washers and scrubbers through having removed the pressure from the interior of the retorts. Perhaps he ought to apologise to Mr. Fraser for the remark in his paper that it was nothing but the ignorance of the parties concerned which prevented the use of exhausters. At all events the remark did not apply to Scotland, because there they were not so much required. When making gas of cannel coal, an ammoniacal liquor of weak quality was obtained, and washers and scrubbers were not much used, so that exhausters were not so necessary.

Mr. FOULIS said in Glasgow all the liquor they sent out was of 5° Twaddle, and would take 10 oz. of acid to saturate it. They used both washers and scrubbers.

Mr. ANDERSON said, in that case, the pressure on the retorts being increased, exhausters became necessary. Mr. Darney said the men in his employ were proud of the exhauster, and this was a point worth notice. If men could be got to take a pride in anything, it raised their moral tone altogether, and was an important step towards securing a generally improved state of things on the works.

Mr. NEWALL said he had seen the apparatus which had been alluded to at Littleborough. Before the exhauster was put up, they found the more gas they made the weaker was its illuminating power, and he thought Mr. Anderson's paper was scarcely complete, as it did not give the illuminating power of the gas under both circumstances. Even for works of the size of Littleborough, where in the summer time there were only three retorts at work, an exhauster was very useful, for it enabled them to pump their ammoniacal liquor. The fuel required was only the waste which came from the ashpit, and the men got nothing additional for attending to the engine, so that the expense was very little indeed. He quite agreed with Mr. Anderson that those gentlemen who had made large profits without an exhauster would find a satisfactory addition to their receipts by its adoption.

The HONORARY SECRETARY read the following paper, in the absence of the writer:—

ON A NEW EQUILIBRIUM GAS-GOVERNOR.

By Mr. CHARLES HUNT.

The proper regulation of the supply of gas to the districts is a matter of considerable consequence in gas engineering. Before an audience such as I have now the honour of addressing, it is quite unnecessary for me to enlarge upon its advantages, or do more than observe how much the comfort of the consumer is dependent on, and the anxiety of the engineer relieved by, the satisfactory performance of this important duty. I will not, therefore, attempt to excuse myself for venturing to occupy a small portion of your time in bringing before you what I conceive to be an improvement in the means employed for effecting this desirable object.

The ordinary governor, although an advance upon the slide-valve for the purpose of regulating pressure, is yet far from satisfactory in its present forms or in its action. Apart from its size, which, looking at the gigantic proportion now assumed by gas manufacture, is not unworthy of consideration, its liability to oscillate, and its inability to maintain a uniform pressure under variations of inlet pressure, are faults which militate seriously against its practical usefulness, being fruitful sources of annoyance, and even danger.

The latter defect I believe to arise from the use of a suspended valve. There is no doubt that a gasholder in equilibrium, actuating a valve placed upon the inlet, will perfectly control the outlet pressure, provided the valve be also in equilibrium. This essential condition is not fulfilled in the case of the conical valve of an ordinary governor, where the bottom of the cone, or surface of exposure to inlet pressure, is in effect a part of the area of the gasholder, and, therefore, any variation of pressure upon it at once disturbs the equilibrium of the holder, which only a corresponding alteration of outlet density can restore. This is borne out by experience of a twofold character. It is found in practice that those governors are the most to be depended on in which the greatest difference exists between the areas of the gasholder and the bottom of the cone, or, what is almost the same thing, the connecting inlet-main; so that it follows that, in order to secure the greatest efficiency, you must magnify dimensions already far too cumbrous. Again, it is beyond a doubt that with a properly balanced valve no such fault is apparent. Every one is familiar with the action of Wright's exhaust regulator. Whatever difference of opinion may exist as to the advisability of this means of regulation—and I do not wish to be understood as advocating it—there can be no question that what it is designed to do, Wright's apparatus does very efficiently. Exposed to variations greater than any governor is or can be subject to, it is impossible not to admire the steadiness with which the required vacuum is maintained. And this is accomplished by means of a throttle-valve, which is a balanced valve.

The other defect to which I have alluded is the liability to oscillation. There can be few who are not more or less familiar with this nuisance, so apt to give rise to unpleasant complaints from the districts, and against which it often requires the utmost watchfulness to guard. It is attributable to the large area of the inlet and outlet compared with the capacity of the gasholder, which latter, in its efforts to resist the influence of disturbing causes and maintain its equilibrium, rises and falls with extreme rapidity, and thus, by alternately opening and closing the valve, occasions oscillation. Here, again, a partial remedy is found in the enlargement of the area of the gasholder; but this, although true to the principle of the suspended valve, does not find much favour, if we are to judge by the number of annular governors in use. It is also overcome by covering up the inlet and outlet pipes, leaving only a small opening for the passage of the outlet gas into the holder; but this, besides being an admission of faulty construction, is apt to render the action of the governor extremely sluggish and so far additionally unreliable. The substitution of a balanced valve, with small actuating holder, presents none of these drawbacks, and is at once more economical and thoroughly efficient.

The improvement by which I conceive I have rendered the throttle-valve more applicable to the purposes of a governor, consists in placing the lever or radius-arm inside, upon the disc or throttle, instead of outside, at the end of the spindle, which ordinarily carries the disc. The necessity for a stuffing-box is thereby avoided; and instead of the spindle, the disc is carried by two small steel centres, upon which it is accurately balanced, and turns freely. The friction being thus reduced to a minimum, the valve is rendered extremely sensitive to variations of pressure, and a very small holder (less than one-sixth the size of those usually employed) is sufficient to actuate it. The pipe which conveys the outlet gas to the holder is connected to the valve immediately over the top of the lever or radius-arm, and thus serves to enclose the connecting-rod, all external communication being thereby avoided. Provision is made by small man-holes at top and bottom for getting at the valve, should it happen to foul with naphthaline or from any other cause.

The advantages of this arrangement are sufficiently obvious. The valve, being separate from the holder, can be handled and fixed like an ordinary slide-valve, taking up very little more space, and thus simplifying the necessary connexions to the greatest possible extent. The gasholder, which is placed at any convenient distance immediately over the valve, having little or no friction to overcome, only requires to be just large enough to work freely, and the passage of the outlet gas into it may be contracted to the smallest dimensions, thus effectually precluding the possibility of disaster from an escape such as that which occurred at the London Gas-Works a few years ago. The weight of the lever, connecting-rod, and gasholder, is balanced by an internal air-vessel, and the required pressure is obtained in the usual manner.

In conclusion, I may state that an 8-inch valve, actuated by a holder only 12½ inches in diameter, has been in successful use at the above works for the last eight months; and a second, for an 18-inch main, with holder 17 inches diameter, the original of the drawing exhibited at this meeting, has within the last few days been fixed.

Mr. HARTLEY said he had nothing to urge against the principle of the governor just brought under consideration. It certainly appeared to him to be a very excellent arrangement. He merely rose for the purpose of referring to one expression in the paper. Mr. Hunt asserted that the covering up of the inlet and outlet pipes, thus reducing the passage for the outlet gas into the holder, was a confession of a defect in construction. It really was no more so than the application of the governor was to a steam-engine. It served a purpose—to steady the instrument. In reference to the arrangement brought forward by Mr. Hunt, he had seen the apparatus in action and it seemed to do its work very well. But there was, no doubt, something in having a real gasholder, that gave a man a sensible weight to deal with. He did not know whether Mr. Hunt was right in saying that those governors were most to be depended upon in which there was the greatest difference between the areas of the gasholder and the bottom of the cone. He could only say that he had himself manufactured small gasholders with large cones, and they had been found to work admirably enough in certain conditions.

Mr. G. PARKINSON asked whether he was to understand Mr. Hartley as asserting that there was no necessary proportion between the gasholder and the cone.

Mr. HARTLEY replied, not wholly so, but that he had made them of different areas and proportions. Certainly proportion must have something to do with it.

Mr. G. PARKINSON maintained that they bore a direct proportion to each other, or should do so. It depended very much upon the weight of the cone and on the means by which the gas was admitted.

Mr. W. C. PARKINSON said the area of the gasholder should be as many times the area of the cone as it was desired to reduced the pressure.

At the close of the sitting the members of the association visited by invitation the works of the Alliance and Consumers Gas Company, in Great Brunswick Street, where they were met by Mr. Moylan, the chairman, and Messrs. Drummond and Milo Burke, directors, accompanied by Mr. John Somerville, the chief engineer.

At the close of the tour of inspection the members of the association were entertained at a *déjeuner* served up in one of the rooms of the building, which was appropriately and tastefully decorated with flags and evergreens.

The chair was occupied by Alderman MOYLAN.

After the usual loyal and patriotic toasts had been responded to,

The CHAIRMAN proposed—"Prosperity to the British Association of Gas Managers." He cordially welcomed the members to his native country, and expressed a hope that their visit would yield them unmingled satisfaction. His only regret was that on this occasion the secretary of the company was necessarily absent in London on parliamentary business, so that their reception was not so formal and becoming as he could desire.

The PRESIDENT (Mr. White), in a few appropriate observations, expressed the pleasure which he and the members generally felt in visiting Ireland, and their sense of the kind and hearty welcome with which they had been received. He concluded by proposing—"Success to the Alliance and Consumers Gas Company, and prosperity to the city of Dublin."

The toast was drunk with all the honours, and the CHAIRMAN responded.

The health of Mr. Stevenson, the secretary, and Mr. Somerville, the engineer, followed, and Mr. SOMERVILLE having acknowledged the compliment paid to him, Mr. CHARLES STEVENSON responded for his father, and the party then broke up.

(To be continued.)

AVERAGE COMPOSITION AND QUALITY OF THE METROPOLITAN WATERS, IN JUNE, 1871.—The following are the returns of the Metropolitan Association of Medical Officers of Health:—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.		Hardness.	
			As Nitrates, &c.	As Ammonia.	Before Boiling.	After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	18·29	0·073	0·126	0·003	14·1	3·6
West Middlesex	17·97	0·024	0·114	0·001	13·8	3·6
Southwark and Vauxhall	18·63	0·079	0·114	0·002	14·2	4·0
Chelsea	17·67	0·076	0·114	0·003	14·0	3·6
Lambeth	18·23	0·073	0·118	0·002	14·0	3·8
Other Companies.						
Kent	27·53	0·012	0·217	0·000	20·6	5·8
New River	17·37	0·036	0·129	0·000	14·0	3·3
East London	18·47	0·049	0·146	0·000	14·6	3·7

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases but the following, when it was more or less turbid—namely, in those of the Southwark and Vauxhall and the Lambeth Companies. The average quantity of water supplied daily to the metropolis during the preceding month was, according to the returns of the water companies to the Association of Medical Officers of Health, 108,692,357 gallons; and the number of houses supplied was 487,198. This is at the rate of 33·3 gallons per head of the population daily.

H. LETHEBY, M.B.

Register of New Patents.

2275.—ALFRED WILLMER POCOCK, of Pimlico, in the co. of Middlesex, engineer, for "*Improvements in meters for measuring water and other liquids.*" Provisional protection only obtained. Dated Aug 17, 1870.

These improvements relate to the employment of one or more eccentrically worked rings, cupped or otherwise, on the main shaft, which cover and uncover parts as it or they rotate. Also a new construction of plug composed of two discs, and connected by a cross rib; a rim is carried about half way round the edge. There is a well in one disc, and also a passage leading to the edge to allow the water to pass through it. The seating for the plug has four holes in it, which lead to the upper and lower parts of the cylinders. The two holes for each cylinder are exactly opposite each other, to ensure the proper action of the pistons. There is also a hole in the centre of the seating for the outflow.

2278.—WILLIAM HARVEY, of Brewer Street, in the co. of Middlesex, gas and hot water engineer, for "*Improvements in the construction of water-cocks and gas-cocks.*" Patent dated Aug. 17, 1870.

These improvements consist in making the body of the cock with two or more supply or entrance apertures, and one exit aperture, through which the water from the two supplies will pass. The plug of the cock is made solid, and is provided with the apertures corresponding to the openings in the body. The openings in the body are made of double the width or superficial area of the corresponding openings in the plug, and the two supply openings are so arranged, in reference to each other, that the full supply from both may be passed at the same time through the plug to the exit opening. As the openings in the body of the cock are twice as wide as the corresponding openings in the plug, the latter may be turned on its axis, to a certain extent, so as to cut off the flow partially or wholly from one supply without necessarily affecting the supply from the other. The plug is kept down on the seat by means of a spring, and the spindle of the plug passes up through a dial-plate, and on this spindle is mounted an index or pointer, and a handle for turning the plug in any desired direction.

2297.—JOSEPH JUDGE HAYS, of Hertingfordbury, in the co. of Hertford, gentleman, for "*Improvements in purifying, deodorizing, and utilizing sewage and other refuse and deleterious matters, and for machinery therein employed.*" Patent dated Aug. 20, 1870.

In carrying out these improvements a process is employed of mixing ground peat, peat charcoal, or other earthy, carbonaceous, and metallic matters with the sewage or other deleterious matters, as the same issue from the main drain, sewer-pipe, or other outlet, though they may be mixed together at any other point, as circumstances may determine or require. This it is preferred to effect in a machine consisting of a rotary wheel carrying blades or arms, and partially immersed in the fluid sewage or other deleterious matter. This wheel rotates in a chamber, over which is a screw arrangement, working in a hopper or other contrivance, for supplying a given quantity of dust ground from peat or peat charcoal, or other absorbing material of a similar character, as the case may be. The screw for feeding the dust to the wheels should be made to turn by means of a small water-wheel, actuated by the flow of the sewage or other deleterious matter, or by any other contrivance; and thus, when once regulated to supply a certain quantity of peat charcoal dust (to a given quantity of sewage or other deleterious matter), it continues self-acting. The mixing-machine may, when necessary, be set in motion by steam or other power, which amalgamates the sewage with the dust, and these are made to flow together by suitable channels into settling reservoirs or tanks. These tanks should be arranged in series, in order to facilitate the removal of the manure or other deposited matter from one or more, the remainder receiving the sewage or other deleterious matter from the mixers.

2319.—FREDERICK HOLMES, of Gritton Terrace, Victoria Park, in the co. of Middlesex, for "*Improvements in pumps.*" Patent dated Aug. 23, 1870.

This invention relates, firstly, to the construction of a double-action pump; and, secondly, to the construction of a quadruple-action pump.

In constructing a double-action pump, a pump-barrel provided with a plunger, and having two longitudinal external channels, is employed. One of these channels (No. 1) is in communication at its lower end with the suction-pipe, and at its upper end with the upper chamber of the pump-barrel. The other channel (No. 2) is in communication at its lower end with the lower chamber of the pump-barrel, and at its upper end with the delivery-pipe. The upper chamber is in communication with the delivery-pipe, and the lower chamber with the suction-pipe. Valves are fitted between the suction-pipe and channel No. 1, between the suction-pipe and the lower chamber, between the lower chamber and channel No. 2, and between the upper chamber and the delivery-pipe.

The action is as follows:—In the up stroke of the plunger water enters the lower chamber from the suction-pipe, while the water contained in the upper chamber is forced into the delivery-pipe. In the down stroke the water in the lower chamber is forced through channel No. 2 to the delivery-pipe, while water is drawn from the suction-pipe, through channel No. 1, into the upper chamber.

In constructing a quadruple-action pump, the arrangement just described is substantially adopted, but the pump-barrel is divided transversely by a stuffing-box into two barrels, each being provided with a plunger, the two plungers being on the same rod; and channel No. 1 communicates with the upper chamber of each barrel, and channel No. 2 communicates with the lower chamber of each barrel. The communication between the suction-pipe and the lower chamber of the upper barrel is formed by the lower part of channel No. 2. It will be seen that, with this quadruple-action pump, 24 inches stroke is obtained from a 6-inch stroke of the pump-rod.

2331.—ALBERT MARCIUS SILBER, of Wood Street, Cheapside, in the City of London, merchant, for "*Improvements in apparatus for lighting and heating purposes.*" Provisional protection only obtained. Dated Aug. 24, 1870.

This invention consists in the construction of a lamp-burner, or apparatus for lighting or heating, with a vertical passage or channel for inflow or up-draught of air to the flame from the lower portion of the lamp or apparatus up to and through the burner, wick, holder, or flame. This passage or channel is usually arranged so that it shall be central of the lamp or flame. It may or may not be closed at bottom. When so closed, it is supplied with atmospheric air through apertures formed in the sides, shell, case, or body of the lamp or apparatus; and it is best to form the orifices at regular intervals round the periphery, so that air may be drawn in on all sides, and attracted centrally and upwards towards the flame. For brackets or arms, and for suspended lights, the air-passage may be formed in a prolongation or appendage dependent from or connected with the burner, or the part to which it is fitted.

2338.—ALFRED VINCENT NEWTON, of 66, Chancery Lane, in the co. of Middlesex, mechanical draughtsman, for "*Improvements in liquid-meters.*" A communication. Patent dated Aug. 25, 1870.

This invention relates to meters which employ two or more reciprocating pistons working in adjacent cylinders, and controlled by valves operated by the pistons, and it consists in a certain combination of such devices whereby each piston is made to operate a separate crank-shaft that is connected by gearing with the crank-shaft of the adjacent piston, and the valves are operated by the pistons which they respectively serve to control. By such arrangement or combination cross passages from the valves to the cylinders are dispensed with, and although the crank-shafts are geared to make them work in time and to carry the cranks over the dead centres, yet each piston with its crank-shaft and valve is separate and distinct from the other, so that said parts are made to maintain their proper relative positions in case of wear at the joints or bearings of the connexions which couple either piston with its respective valve. Furthermore, the arrangement is such that leakage from the one cylinder to the other is avoided, and the gear-wheels that serve to couple the said shafts operate by lateral pressure of the fluid on them to make close or water-tight the bearings through which the crank-shafts revolve.

The invention also includes a novel arrangement of passages and peculiar construction of the cylinders whereby cheapness and simplicity are secured, and the cylinders which are formed out of the tubes are retained in position by merely swelling or riveting down their ends.

A meter constructed in accordance with this invention may be got up cheaply, and will be found efficient and accurate under both light and heavy streams.

2350.—THOMAS LACEY, of St. Paul's Road, Canonbury, and STEPHEN CHARLES LACEY, of Canonbury Park Square, both in the co. of Middlesex, for "*An improved apparatus for stopping the flow of gas through a meter when any determined quantity has been supplied.*" Patent dated Aug. 26, 1870.

This invention relates to a supplemental apparatus which is designed to be arranged in combination with the ordinary index or registering apparatus of a gas-meter, for the purpose of preventing the passage through the meter of more than a certain quantity of gas, which has been previously determined upon.

The object of the said invention is the provision of means whereby the losses now frequently suffered by gas companies from defaulting consumers may be entirely obviated, and an effectual and satisfactory method provided of supplying to the consumer a certain and definite number of cubic feet of gas, which shall be paid for in advance, the supply of gas being stopped by the automatic action of the apparatus when the quantity paid for or determined upon has been used.

The supplemental apparatus is preferably used in combination with the ordinary registering or index apparatus of a gas-meter, but may be used without such index apparatus if desired. This supplemental apparatus has a dial or face whereon is marked a series of figures from zero to any desired number. An index hand or pointer is arranged to move over these figures, and is adjustable by means of a key or a small milled button or otherwise, so that it may be set to the figure on the dial corresponding with any desired quantity or number of cubic feet of gas. The spindle of the index hand carries a toothed wheel which is geared through an intermediate pinion with one of the wheels of the ordinary index apparatus of the meter. The wheels are so arranged that by the action of the meter the said hand will move backward from the figure over which it has been set to the zero point until the quantity of gas represented by that figure has been consumed. By observing the approach of the hand to zero, the consumer can order a fresh quantity of gas before the quantity originally supplied has been entirely used. The spindle or the wheel carried thereby is arranged in combination with a lever or other suitable device, and when the index hand arrives at the zero point, this lever or other device will stop the action of the meter by interposing an obstruction to some moving part thereof, or by closing a valve, thus preventing the passage of any further quantity of gas through the meter.

This invention is applicable to either wet or dry meters of any form and construction.

APPLICATIONS FOR LETTERS PATENT.

1605.—THOMAS CRAIG, of Glasgow, in the co. of Lanark, N.B., gentleman, for "*A new or improved machine for sweeping streets.*" June 17, 1871.

1622.—MATHIEU LÉON SOMZÉ, of Brussels, in the kingdom of Belgium, engineer, for "*Improvements in the construction of joints for water, gas, and other pipes.*" June 20, 1871.

1641.—EDWARD THOMAS HUGHES, of the firm of Hughes and Son, of 123, Chancery Lane, London, patent agents, for "*An improved valve for stopping and regulating the supply of water, steam, gas, air, and other similar purposes.*" A communication. June 22, 1871.

1671.—WILLIAM BURNS, of Little Ilford, in the co. of Essex, for "*Improvements in pipe-joints.*" June 26, 1871.

1695.—MIGUEL PINDER, of Faro Algarve, Portugal, but at present of Walworth, in the co. of Surrey, for "*Improvements in joints for pipes.*" June 29, 1871.

GRANTS OF PROVISIONAL PROTECTION.

1269.—JULIUS FRANS FAHLMAN, Swedish-Norwegian Vice-Consul at Iliza, Balearic Island, Spain, at present in Stockholm on leave of absence, for "*An improved system of disinfecting fœcal matter, and apparatus employed therein.*" May 11, 1871.

1341.—JOSIAH GEORGE JENNINGS, of Palace Road, Lambeth, sanitary engineer, for "*Improvements in the construction of receptacles for waste waters.*" May 18, 1871.

1395.—THOMAS FLETCHER CHAPPÉ, of Bolton, in the co. of Lancaster, cotton spinner, and member of the Society of Civil Engineers, for "*Improvements in valves for regulating the flow of steam, fluids, and gases.*" May 24, 1871.

1417.—ALFRED ATKINSON POLLOCK and JULIUS FREDERICK MOORE POLLOCK, both of Leeds, in the co. of York, for "*Improvements in dry closets and commodes.*" May 26, 1871.

1461.—WILLIAM CLAY, of Birkenhead, in the co. of Chester, iron manufacturer, for "*Improvements in the construction of gas-furnaces.*" June 1, 1871.

1530.—WILLIAM POUPARD, of the Blackfriars Road, and JAMES THOMSON, of the Old Kent Road, both in the co. of Surrey, for "*Improved means of ventilating buildings, tunnels, passages, and places.*" June 9, 1871.

1622.—MATHIEU LÉON SOMZÉ, of Brussels, in the kingdom of Belgium, engineer, for "*Improvements in the construction of joints for water, gas, and other pipes.*" June 20, 1871.

NOTICES TO PROCEED.

412.—WILLIAM TATTERS, of Patmore Street, New Road, Battersea, in the co. of Surrey, engineer, for "*Improvements in registering or indicating apparatus.*" Feb. 17, 1871.

461.—BENJAMIN SLATER, of Wellington Foundry, Charles Street, City Road, in the co. of Middlesex, ironfounder, for "*Improvements in apparatus for regulating the turning of gas, water, or other cocks, the opening and closing of ventilators, skylights, and other like objects.*" Feb. 22, 1871.

490.—JOHN LOWTHIAN, of 38, Lowther Street, Carlisle, in the co. of Cumberland, for "*Improvements in water-flushing apparatus.*" Feb. 24, 1871.

517.—ALEXANDER ARMOUR, of Liverpool, in the co. of Lancaster, for "*An improved ammoniacal gas-engine.*" A communication. Feb. 25, 1871.

1247.—GEORGE WARSOP, of 76, Royal Terrace, Queen's Walk, Nottingham, for "*Improvements in pipe-wrenches.*" May 9, 1871.

1376.—GUILLERMO REINLEIN, of Madrid, in the kingdom of Spain, officer in the Spanish army, for "*An improved pump.*" May 23, 1871.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

1930.—CLÉMENT ROSTAING and ELIE VIVET, "*An improved material suitable for making steam, water, and gas tight joints, and for similar uses.*" June 12, 1868.

1980.—CHARLES HENGST and HENRY WATSON, "*An improved mode of and means for manufacturing gas for lighting and heating purposes.*" June 18, 1868.

2006.—ROBERT AUSTIN and WILLIAM KERR AUSTIN, "*Improvements in rotatory engines and pumps.*" June 22, 1868.

2029.—BENJAMIN THEOPHILUS MOORE, "*New or improved apparatus for protecting water-pipes from injury by frost.*" June 24, 1868.

Price Current.

CASTINGS.—*Per Ton.*

Average Weight of Cast-iron Gas-pipes, per Yard.

1 in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	35	51	70	89	107	126	149	177	208 lb.

Retail Prices are 5 to 10 per cent. higher.	London.			Glasgow.			Newcastle and Middlesboro'.			Wales.			Yorkshire, Derbyshire, and Staffordshire.		
	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.
Pig Iron, No. 1 (g.m.b.)	3	15	0	2	17	6	2	11	0	3	10	0	3	15	0
1¼ and 2-inch Socket-pipes	7	0	0	5	15	0	5	10	0	6	0	0	7	0	0
2½ and 3-inch ditto	6	10	0	5	5	0	5	0	0	5	15	0	6	10	0
4 and 5-inch ditto	6	0	0	4	15	0	4	10	0	5	5	0	6	0	0
6 inches and upwards ditto	5	15	0	4	5	0	4	0	0	5	0	0	5	15	0
Retorts, 1st fusion, hot blast	5	10	0	4	10	0	4	5	0	5	0	0	5	10	0
Ditto, 2nd ditto, cold ditto	6	10	0	—			—			—			6	10	0
Tank-plates, ¼ thick and above	6	0	0	5	0	0	4	15	0	5	10	0	6	0	0

WROUGHT-IRON TUBING,

Subject to 60 per cent. Discount.

	2 in.		1½ in.		1¼ in.		1 in.		¾ in.		½ in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Patent Welded Tubes, from 2 to 14 feet—per foot	1	8	1	1	0	10	0	7	0	5	0	4½
Ditto ditto, from 12 in. to 23½ in.—each	2	0	2	0	1	6	1	1	0	9	0	8
Long Screws, from 12 in. upwards	4	0	3	3	2	0	1	6	1	2	0	11
Bends and Springs	4	3	3	3	1	9	1	3	0	11	0	8
Square Elbows, equal or reducing; Round Elbows, 5 per cent. extra	3	9	2	3	1	9	1	3	0	10	0	8
Tees, wrought or cast	4	0	2	6	2	0	1	6	1	1	0	9
Crosses, ditto, equal or reducing	4	9	3	6	3	0	2	3	1	9	1	6
Iron Cocks	20	9	13	0	10	6	7	3	5	0	3	8
Ditto, with brass plug	28	0	16	0	13	0	7	0	5	6	4	6
Diminishing Sockets, Caps, Plugs, and Nipples	1	3	0	9	0	9	0	6	0	5	0	4½
Plain Sockets	1	6	0	8	0	7	0	5	0	4	0	3
Syphons, 2-quart	15	0	14	0	13	6	13	0	12	0	—	

FREIGHTS.

Coastwise—Newcastle:—	Per Ton.	*Foreign:—*	Per Keel.
Chatham and Rochester	5s. 9d	Barcelona	£22 10s
Cork	8 0	Bordeaux	10 0
Dover, Folkestone, and Ramsgate	6 0	Boulogne and Calais	7 10
Dublin	8 0	Cadiz	16 0
Exeter Quay	7 0	Cronstadt	9 10
Ipswich	5 6	Copenhagen	8 0
London (from Leith)	5 9	Genoa	17 10
London (Pool)	5 9	Hamburg	9 10
Lowestoft and Yarmouth	5 0	Havre de Grace	8 0
Portsmouth & Southampton	7 0	Leghorn	17 10
Plymouth	8 0	Lisbon	13 0
Shoreham	7 0	Rotterdam	8 0
Whitstable	5 0	Stettin	9 10
Weymouth	7 0	Trieste	19 10
		Venice	21 0

SUNDRIES.

Best Newcastle Fire-bricks, per 1000	£2 10s. to £2 15s. 0d.
Cliff's Fire-bricks (at Wortley), per 1000	2 15 6
Ingham's ditto (at Wortley), per 1000	2 15 0
Farnley Iron Co.'s Fire-bricks (at Wortley), less discount	2 17 0
Fire-clay Retorts, per foot run	5s. 6d. to 0 7 6
Tarred Rope Yarn, per cwt.	1 0 0

GAS COALS.

Newcastle—Unscreened:—	Per Ton 6s. 6d.
Haswells, Nettlesworth Primrose, and South Pelaw	
Pelling, Framwell Gate, North Pelton, Redheugh Main, Walker's Primrose, West Wear, and Whitwell Primrose	7 6
Burnhope, Craghead, Charlaw, Derwent, East Castle, Edmondsley, Eighton Moor, Hartlepool Pelaw, Holmside, Lambton's Gas, Lanchester Pelaw, Medomsley, Mickley, New Pelaw, Pelaw Main, Ravensworth, Seaham, South Moor Pelton, South Leverson, Townley Main, Tyne Main, West Pelaw, Wearmouth Hutton, and Witton	7 0
Pearith, Ravensworth Pelaw, Waldridge, West Garesfield, and West Pelton	7 3
Brancepeth, Dean's Primrose, Londonderry Gas, New Pelton, Pelton, South Pearith, Stella, Urpeth, Washington Hutton, and West Leverson	7 6
Ramsay's Newcastle Cannel	17 6
Wigan Cannel (at Liverpool)	17 0

Scotch Cannel, f.o.b.:—	Per Ton.	*Scotch Cannel*, f.o.b.:—	Per Ton.
Boghead—at Bo'ness, 47s. 6d.; at Leith 48s. 2d		Arniston (at Leith)	21s. 0d
Muirkirk	27 0	Wemyss (at Wemyss)	20 0
Kirkness, best (at Burntisland)	22 6	Haywood Co.'s Haywood (at Granton)	21 0
Capeldrae, 1st quality (at ditto)	23 6	Firnie, or Methill	17 0
Ditto, 2nd ditto (at ditto)	17 6	Lothian's Cannel (at Leith)	24 6
Cowdenbeath (at ditto)	13 0	Grange ditto (at Bridgeness)	17 6
Lochgelly (at ditto)	13 0	Kinniel ditto (at Bo'ness)	17 6
Donnibristle—at Burntisland, 12s.; at Aberdour	12 6	Myles' ditto	23 6
Auchinheath Lesmahago (at Granton)	27 0	Lochore Parrot (at Burntisland)	25 0
Duke of Hamilton's Lesmahago (at Granton)	27 0	Do. (at Waverley Seam)	16 0
		Lanemark (at Glasgow)	16 0
		Elphinstone Tower (at Leith)	20 0

WEEKLY METAL REPORT.

(*From* J. Berger Spence & Co.'s *Circular.*)

Iron.—"Ayresome" Yorkshire pig iron firm—No. 1, 51s. 6d.; No. 2, 49s. 6d.; No. 3, 48s.; No. 4 (foundry), 47s.; No. 4 (forge), 47s. net cash, or 1s. extra four months. Scotch pig steady, at 57s. to 57s. 6d. Welsh bars, £6 15s. to £7. Staffordshire bars, £7 10s. to £8. Hoop iron, £8 10s. Gas-tubes, 60 per cent. to 67½ per cent. off list. Boiler tubes, 40 per cent. to 42½ per cent.

Copper is further improved. English tough ingot, £74 to £74 10s. Chili bars, £67 10s. to £68.

Tin.—Selling freely. English, £132 to £132 10s. Straits, £131 to £131 10s.

Tin-plates.—Coke, I.C., at 23s. to 24s. Charcoal, I.C., 28s. to 30s. per box.

Lead.—Unaltered. Best English soft pig, £18 5s. to £18 10s.

Antimony.—French Star, £49 to £50.

Spelter.—Improving in value. Silesian, special brands, £18 to £18 10s. English, £18 10s. to £19.

Just published, crown folio, crimson cloth, lettered, price 12*s. 6d., by post* 13*s. 2d.,*

A FULL DESCRIPTION

OF THE

BECKTON WORKS

OF THE

CHARTERED GAS COMPANY,

WITH

SEVENTEEN SELECTIONS FROM THE WORKING DRAWINGS,

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F. J. EVANS, Esq., M.I.C.E.,

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WM. B. KING, 11, BOLT COURT, FLEET STREET, E.C.

Share List of Metropolitan Gas Companies.

Number of Shares issued.	Amount per Share.	Name of Company.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Latest Quotations.
	£		£ s. d.	£ s. d.	£
8000	20	Anglo-Romano	20 0 0	10 0 0	22 — 23
5000	20	Bahia (Limited)	20 0 0	3 0 0	13½ — 14
1000	20	Do., preference	20 0 0	10 0 0	24 — 26
750	20	Do., do., redeemable	20 0 0	10 0 0	20 — 22
40000	5	Bombay (Limited)	5 0 0	6 15 0	6¼ — 6⅜
10000	5	Do., third issue	4 0 0	6 15 0	5 — 6
10000	20	British (Limited) (Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton [Potteries], Trowbdge., & Holywll.)	20 0 0	10 0 0	34 — 35
7500	20	Cagliari (Limited)	20 0 0	7 0 0	19½ — 20½
112000	10	*Chartered*	10 0 0	8 0 0	15 — 16
10000	10	Do., B shares, 4 per cent. max.	10 0 0	4 0 0	6¾ — 7¼
25000	10	Do., 5 per cent. preference	10 0 0	5 0 0	12¾ — 13½
20000	10	Do., 5 per cent. preference, second issue	8 0 0	5 0 0	2¼—2¼pm.
20000	10	Do., 10 per cent. preference	10 0 0	10 0 0	19 — 20
17490	25	*Commercial*	25 0 0	10 0 0	43½ — 44½
20000	20	Continental Union	20 0 0	8 0 0	25 — 27
10000	20	Do., new	7 10 0	8 0 0	2¼—3 pm.
5213	20	Do., preference (France: Strasbg., Cette, Nismes, Montargis, Vienne, Roanne, Beaucaire, Rueil, Albi. Italy: Milan, Genoa, Parma, Modena, Alessandria, Messina.)	20 0 0	7 0 0	25 — 26
5000	10	*Crystal Palace District*	10 0 0	0 0	16¼ — 16⅞
5000	10	Do., preference	10 0 0	0 0	11 — 12
6044	10	Do., new shares	10 0 0	7 0 0	12 — 13
3956	10	Do.	1 0 0	7 0 0	1¼—1⅝ pm.
4000	50	*Equitable*	50 0 0	10 0 0	94 — 96
4000	25	Do., new shares	25 0 0	10 0 0	46½ — 47½
23406	10	European (Limited)	10 0 0	11 0 0	16 — 16½
12000	10	Do., new shares (Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	11 0 0	3¼—3⅜pm.
5000	10	Hong Kong (Limited)	10 0 0	10 0 0	13½ — 14½
26000	50	*Imperial*	50 0 0	10 0 0	87 — 89
26000	10	Do., new shares	10 0 0	10 0 0	17¼ — 17⅞
26000	12½	Do., new shares	12 10 0	7 0 0	16 — 16½
25000	12½	Do., new shares, 1870	5 0 0	7 0 0	2⅜—3¼ pm.
1300	100	Do., bonds	£100	10 0 0	190 —195
56000	50	*Imperial Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam, Aix-la-Chapelle, Antwerp, Bordeaux, Brussels, Cologne, Frankfort-on-Maine, Haarlem, Stolberg, Toulouse, & Vienna.)	45 15 0	9 2 6	67 — 69
400	100	Imperial Mexican (Limited)	100 0 0	nil.	
200	100	Do., new	100 0 0	nil.	
3000	40	*Independent*	40 0 0	10 0 0	68 — 70
3000	10	Do.	10 0 0	5 0 0	8 — 9
3000	20	Do.	17 0 0	7 10 0	3¾—4¼ pm.
7133	Sk.	*London*	100 0 0	10 0 0	174 —176
5610	Sk.	Do., 1st preference	100 0 0	6 0 0	119 —121
503	Sk.	Do., 2nd preference	100 0 0	6 0 0	
214	Sk.	Do., 3rd preference	100 0 0	6 0 0	
£18781	100	Do., 1st preference stock	100 0 0	6 0 0	115 —120
£11828	100	Do., 2nd preference stock	100 0 0	5 0 0	100 —103
15000	5	Nictheroy, Brazil (Limited)	5 0 0	5 0 0	3¼— 4¼
6000	5	Malta and Mediterranean (Limited)	5 0 0	7 0 0	5 — 5½
20000	5	Do., preference	3 0 0	5 0 0	2¼— 2½
30000	5	Mauritius (Limited)	5 0 0	10 0 0	7¼— 8¼
30000	5	Oriental (Calcutta)	2 10 0	10 0 0	1¼—1¾ pm.
10000	5	Do., new shares	5 0 0	nil.	2¼— 2⅝
14000	10	Ottoman (Limited)	10 0 0	8 0 0	31 — 32
27000	20	Park (Limited)	20 0 0	10 0 0	35½ — 36½
3600	100	*Phœnix*	40 0 0	7 10 0	53 — 55
144000	Sk.	Do., new	100 0 0	5 0 0	89 — 91
5000	20	Do.	20 0 0	10 0 0	33 — 35
	20	*Ratcliff*	20 0 0	10 0 0	31½ — 32½
6959	5	Rio de Janeiro (Limited)	5 0 0	6 0 0	
2000	5	Singapore (Limited)	5 0 0	7 10 0	
1500	32½	Do., preference	32 10 0	12 0 0	
4000	50	Shanghai	50 0 0	10 0 0	88 — 90
4000	12½	*South Metropolitan*	12 10 0	10 0 0	21 — 22
20000	12½	Do.	2 10 0	10 0 0	5—6 pm.
15000	10	Do., new shares	10 0 0	10 0 0	16½— 17½
10000	10	*Surrey Consumers*	6 0 0	10 0 0	4½—5½pm.
9000	4	Do., new	4 0 0	5 0 0	3— 3½
1500	10	United General (Limerick)	10 0 0	10 0 0	12 — 13
1500	10	*Wandsworth and Putney*	10 0 0	7 10 0	
1819	10	Do.	10 0 0	7 10 0	
1138	10	Do.	5 0 0	7 10 0	
20000	10	Western (Limited) A shares	10 0 0	10 0 0	17½— 18½
10000	10	Do., B shares	9 0 0	10 0 0	7 —7½ pm.
10000	10	Do., C shares	9 0 0	10 0 0	7 —7½ pm.
20000	10	Do., D shares	1 0 0	10 0 0	2¾—3 pm.
16000	5	*West Ham*	5 0 0	8 0 0	6¼— 6⅝
10000	5	Do., new shares	1 0 0	8 0 0	1¼— 1⅜
551	10	West London Junction (Limited)	10 0 0	6 0 0	
520	10	Do., preference	10 0 0	6 0 0	

THE

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Sunderland, June 28, 1871.

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By Order of the Liquidators of the Gas-Engine Company, Limited,

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TO BE SOLD, at the Rhyl Gas-Works, North Wales, 23 15-in. Mouthpieces for Clay Retorts, ascension-pipes, hydraulic main, and delivery pipes complete. One set of 8-in. double vertical Condensers. One Station-Meter (Bent and Co.), with valves and connexions complete, to pass 4000 feet per hour. Four sets of Purifiers, respectively 6 ft. by 3 ft. 6 in., 4 ft. by 5 ft., 4 ft. by 4 ft., with connexions, &c., complete. Large lot of cast and wrought iron, comprising the interior Fittings of a 10,000 feet Gasholder; and sundry other materials.

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Balance-sheets prepared, Accounts audited, Consultations, Agencies, &c.

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Offices: 22, Coleman Street, LONDON, E.C.

ALFRED PENNY, Gas and Consulting ENGINEER,
WENLOCK IRON-WORKS,
21, WHARF ROAD, CITY ROAD, LONDON.

Mr. PENNY having had a large experience in the construction, alteration, and management of Gas-Works, begs to inform the Directors of Gas Companies that he may be consulted on all matters appertaining thereto. He also manufactures Gasholders, Purifiers, and all the various apparatus used in Gas-Works, and keeps in stock Retorts and Mouthpieces, Socket-Pipes, Bends, Branches, and T-pieces, &c., &c.

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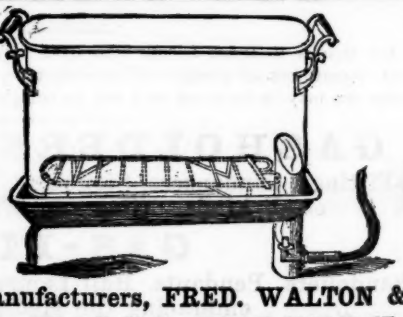

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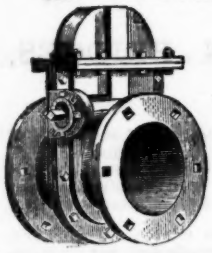

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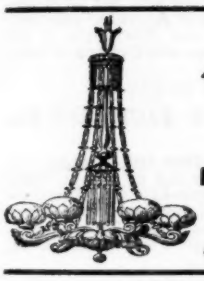

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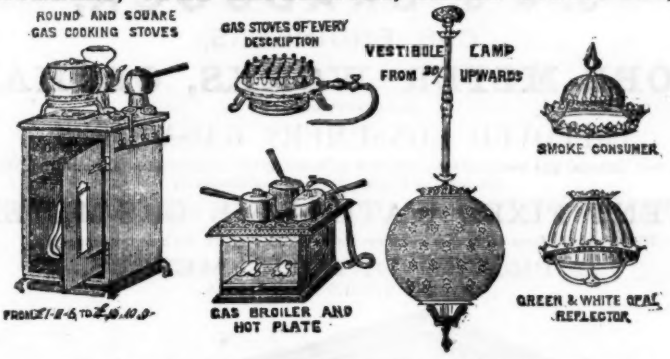
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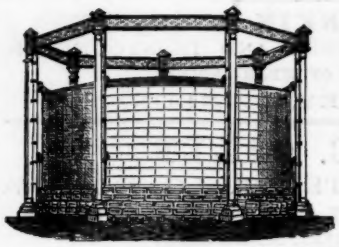

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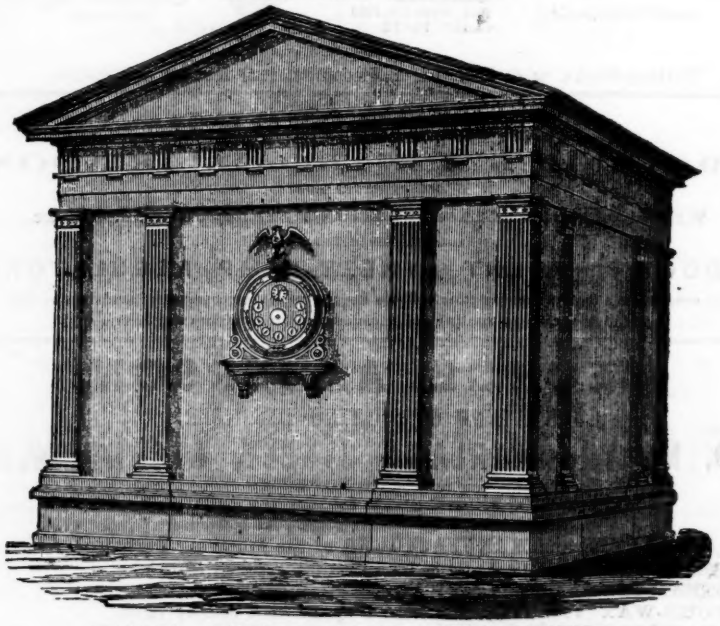

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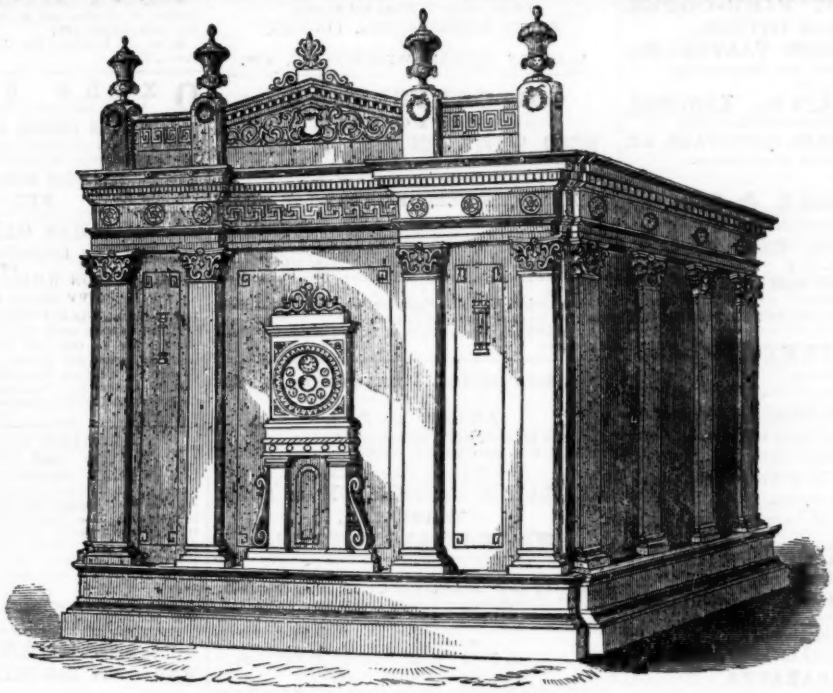

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For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, ROTHERHAM.

BIRTLEY IRON WORKS,
CHESTER-LE-STREET,
DURHAM.
Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.
Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.
Agent in London, Mr. J. MANWARING, 101, Cannon Street, E.C.

OXIDE OF IRON.—We are prepared to supply, on moderate terms,
HYDRATED PEROXIDE OF IRON (BOG OCHRE),
Same quality as supplied by us to several of the most extensive Gas Companies, and which has given entire satisfaction.
FRANCIS RITCHIE & SONS,
BELFAST.

JAMES OAKES & CO.,
LFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 20 & 22, WHARF ROAD,
CITY ROAD, LONDON, N.,
Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.
N.B.—Orders for Cast-Iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention. CHARLES HORSLEY, Agent.

BELGIAN CLAY RETORTS.
J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.
Communications addressed to J. SUGG & CO., GHENT, will receive immediate attention.

D. GRANT & CO.,
WET & DRY GAS-METER MANUFACTURERS.
STATION-METERS ANY SIZE,
PHOTOMETERS, EXPERIMENTAL METERS, &c.
GAS-METER WORKS, CROSS CAUSEWAY,
EDINBURGH.

"METER LIFE BOOK,"
By R. P. KEYS, Accountant, 26, BUDGE ROW, LONDON, E.C.
3rd Edition. Specimen Sheets, illustrated, 5s.; plain, 3s. 6d.
Has been adopted in England, Scotland, Ireland, and India. Simplest plan that has been projected.

C. & W. WALKER'S
DOUBLE-FACED GAS-VALVES FOR LARGE MAINS.
These Gas-Valves for large bores are specially constructed of unusual strength and solidity. The Valve itself is a rigid wedge of cast iron, having two perfectly scraped surface facings, fitting between the two in the body, which are also surfaced. They are guaranteed absolutely tight under any chemical or other test for mains of the largest diameter, at a very moderate price.
Midland Iron-Works, Donnington, near Newport, Shropshire; 8, Finsbury Circus, London.

WILLIAM INGHAM AND SONS,
WORTLEY FIRE-BRICK AND RETORT WORKS,
Near

Leeds.
W. INGHAM and SONS, having for many years been extensively engaged in the Manufacture of
RETORTS AND FIRE-BRICKS FROM THE CELEBRATED WORTLEY FIRE-CLAY,
beg to call especial attention to their RETORTS, which have for many seasons proved to be unsurpassed in quality by any in the Kingdom, their FREEDOM FROM CRACKS and the ADHESION OF CARBON rendering them worthy the attention of all parties interested in the making of Gas.
The Works are of such magnitude as to ensure the prompt execution of orders to any extent.
Estimates for Setting, or Bricklayers sent when required.
GAS OVENS IN SEGMENTS OF EQUAL QUALITY.
A large Stock of Fire-Bricks, Fire-Clay, Terra Cotta, and Drain-Pipes of all Sizes kept in London at Mr. ALFRED WILLIAMS, Wharf, 64, Bankside, Southwark, where all particulars of Prices, &c., may be obtained.
N.B.—*Export orders continue to have prompt attention.*

WILLEY & FORD,
GAS ENGINEERS, EXETER,

Having completed their NEW WORKS in the COMMERCIAL ROAD, for the supply of every description of GAS APPARATUS, respectfully invite the attention of GAS COMPANIES and others to their various Manufactures, especially appertaining to GAS-WORKS.

ENGINEERING DEPARTMENT.

They have lately had the pleasure of ERECTING NEW GAS-WORKS and LIGHTING the following towns:—

Chagford, Holsworthy, and Northtawton, Devon; Chard and Chardstock, Somerset; Trecastle, Brecknshire; and Finchcox, Kent.

They have also executed many improvements and extensions at the following Gas Companies Stations:—BIDEFORD, DAWLISH, DEVONPORT, DARTMOUTH, EXMOUTH, ILFRACOMBE, LISKEARD, ST. AUSTELL, WELLINGTON, DUBLIN, BRECON, CARDIGAN, PONTYPOOL, TOTNES, TRURO, &c., to either of which they refer with much confidence, and the most satisfactory testimony will be given of the manner in which the various works have been executed.

TOWNS or VILLAGES not yet supplied can be lighted with gas at a moderate cost.

PLANS and ESTIMATES furnished and Gas Companies advised on improvements, extensions, and alterations of works.

METER DEPARTMENT.

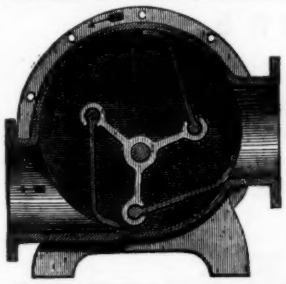
They beg special attention to the excellence and superiority of their DRY METERS, over 2000 being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

GAS-FITTING DEPARTMENT.

An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

☞ *Please note the Address*—

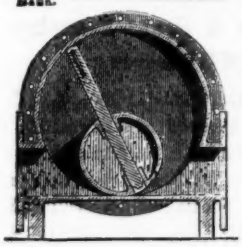
GAS ENGINEERING WORKS, COMMERCIAL ROAD, EXETER.



CHARLES HORSLEY'S
PATENT
GAS EXHAUSTER.
(From 250 Feet upwards per Hour.)
Also,
ROTARY TAR AND OIL PUMPS.
For particulars and prices apply to the Patentee,
22, Wharf Road, City Road, London, N.

TRADE MARK

J. BEALE'S
PATENT
GAS EXHAUSTER.



BEALE'S CONTINUOUSLY ACTING
GAS EXHAUSTERS
ARE NOW MANUFACTURED BY
B. DONKIN & CO.

Mr. J. Beale, of East Greenwich, having retired from business, has made an arrangement with B. DONKIN & CO. for the sole manufacture of his Patent Solid-Slide Gas Exhausters.

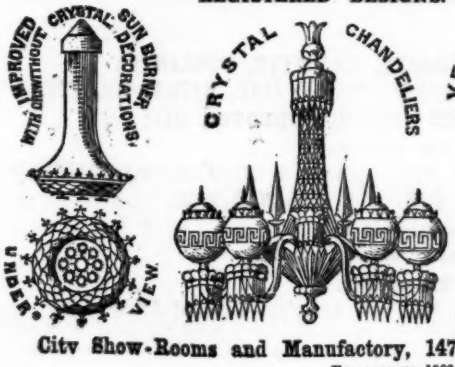
B. D. & Co. also make Steam-Engines to drive Gas Exhausters direct or otherwise.

Estimates and Prices on application to

B. DONKIN & CO.,
ENGINEERS & IRONFOUNDERS,
BERMONDSEY, LONDON, S.E.

TO GAS COMPANIES AND THE TRADE.

J. DEFRIES & SONS,
MANUFACTURERS OF
CRYSTAL, BRONZED, & ORMOLU CHANDELIERS, IMPROVED CRYSTAL STAR & SUN LIGHTS, AND THE PATENT CRYSTAL ILLUMINATION;
Vestibules, Iron Barrel, Composition Tubing, Dry & Wet Meters, & Gas-Fittings
OF EVERY DESCRIPTION.
WORKS: LONDON, BIRMINGHAM, & PARIS.
REGISTERED DESIGNS.



Special Designs prepared in perfect accordance with architectural arrangements. Estimates furnished for the Lighting and Fitting up of Theatres, Music Halls, and Public or Private Building with Gas.

Gas Moons of the newest designs.

The Patent Gas-Regulator and Purifier reduced to 6s. 6d. per Doz.

Pattern-Books of Gas-Fittings, Crystal and Ormolu Chandeliers for 1870, are now complete.

City Show-Rooms and Manufactory, 147, HOUNDSDITCH, LONDON.
Established 1803.

FOR SALE, Mouthpieces, Hydraulic Main, Ascension and Dip Pipes for five beds of Retorts of seven in a bed.
Apply to Tynemouth Gas Company, North Shields.

TO GASHOLDER MAKERS.

THE Directors of the Imperial Gaslight and Coke Company, London, are prepared to receive TENDERS for two large double-lift GASHOLDERS, 200 ft. diameter, to be erected in tanks now constructing at their new works near Bromley, Middlesex. All *bond fide* gasholder manufacturers intending to send in tenders may see the drawings and specification, and copy the same, as well as examine the models, on application to Messrs. Clark and Kirkham, the Company's Engineers, at the Imperial Gas-Works, in Great Cambridge Street, Hackney Road, London, on and after Monday, the 3rd of July next.

Sealed tenders, endorsed "Tender for Gasholder," must be sent to the undersigned not later than Thursday, the 13th of July next.

It is to be distinctly understood that the directors do not bind themselves to accept the lowest or any tender.

Harry Chubb, Secretary.
33, John Street, Bedford Row, London, June 26, 1871.

GASHOLDER AND TANK FOR SALE.

THE Directors of the Croydon Gas Company have FOR SALE for £550, as it stands on the Company's premises at Pitlake, Croydon, a TELESCOPIC GASHOLDER and Wrought-Iron TANK, 80 ft. diameter, with 12 columns, girders, inlet and outlet pipes, syphons, and two valves.

The gasholder is now in use, and can be seen, and further information obtained, on application to Mr. C. Farrand, Manager, Gas-Works, Waddon, Croydon.

By order of the Directors,
W. J. Russell, Secretary (*pro tem.*).
Offices, 23, George Street, Croydon, June 29, 1871.

HIGH WYCOMBE GAS COMPANY.

TENDERS FOR GAS COAL.

THE Directors are prepared to receive TENDERS for the supply of 600 tons of the best NEW PELTON COALS, to be delivered on the Company's works within three months from date of order; also 600 tons of the best WIGAN NUTS, to be delivered on the works at the rate of 150 tons per month, after the completion of the order for New Pelton Coal.

The weight will be ascertained and verified by the Company's weigh-bridge, and paid for accordingly.

Sealed tenders to be sent to me on or before Tuesday, July 11, and marked "Tender for Coals."

The Directors reserve the right to reject any tender.
William A. Padfield, Manager and Secretary.

TENDERS FOR GAS COAL.

THE Directors of the Ratcliff Gaslight and Coke Company are prepared to receive TENDERS for the supply of about 17,500 tons of best GAS COAL, of which a specification may be obtained on application to the Engineer, at the works, New Crane, Wapping, E.

Tenders to be sent in, endorsed "Tender for Coal," on or before the 10th day of July, 1871, to the Secretary, at the Company's Offices, 345, Cable Street, London, E.

TO IRON WORKERS AND OTHERS.

THE Committee of the Brampton Gaslight and Coke Company invite TENDERS, separate or together, for a Corrugated Galvanized IRON ROOF for Retort-House—viz., span, 34 ft.; length, 44 ft.; rise, 9 ft.; dome shape, with six principals and ventilator at top, 30 ft. in length.

Also for HYDRAULIC MAIN, 13 yards 16 in. D-shape; 4 D-shaped Mouthpieces, 24 in. by 12 in.; 4 5-in. Cross-Pipes; 4 5-in. Stand-Pipes; 11 5-in. Dip-Pipes; 1 5-in. Elbow-Pipe.

Plans and specifications may be seen at the Office, on the works.

Tenders for the Roof and ironwork to be sent on or before the 13th day of July next, to the Sub-Committee, endorsed "Tender for Retort-House."

The Committee do not bind themselves to accept the lowest or any tender. By order of the Committee.
Brampton Gas-Works, near Carlisle, June 20, 1871.

TO AMMONIA DISTILLERS AND OTHERS.

THE Directors of the Gaslight and Coke Company are prepared to receive TENDERS for the purchase of the AMMONIACAL LIQUOR manufactured at their Beckton, Blackfriars, and Westminster stations, for One, Three, or Five years, from the 1st of January next. The total yearly quantity manufactured will be about 6,000,000 gallons.

Payments to be made monthly in cash.

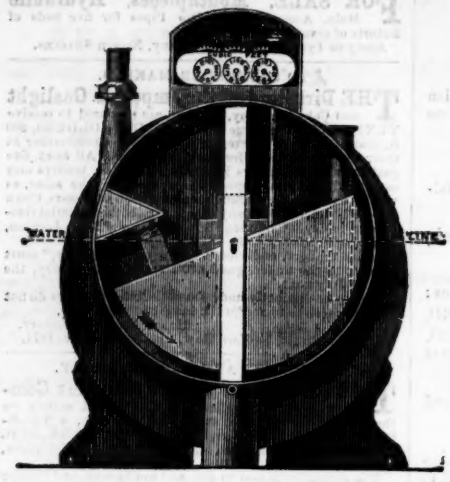
Proposals to be sent in on or before Thursday, the 6th inst., addressed to me, and endorsed "Tender for Ammoniacal Liquor."

The Directors do not bind themselves to accept the highest or any tender, and reserve to themselves the right of accepting the whole or portion of any one tender.

John Orwell Phillips, Secretary.
Chief Office, Horseferry Road, Westminster,
July 1, 1871.

MODERN STREET LIGHTING, by William Sugg, A.I.C.E., price 1s. 6d., is now ready, and will be forwarded post free for 19 stamps.
W. Sugg, Vincent Works, Vincent St., Westminster, S.W.

BRÖNNER'S PATENT GAS-BURNERS.—Henry Greene and Son, the Sole Consignees and Agents for the United Kingdom of Julius Bronner, of Frankfort-on-the-Maine, beg to caution the trade and public generally against purchasing any Gas-Burners, purporting to be Bronner's Burners, not supplied through their Agency. It having come to their knowledge that Gas-Burners not manufactured by Mr. Bronner, but similar thereto in construction, have been imported into England, they have instituted proceedings in Chancery against the party by whom the same were imported and sold, who has thereupon entered into an undertaking and agreement in writing not to make or sell, without Mr. Bronner's licence, any Gas-Burner made according to his invention, under Letters Patent of March 23, 1868, or any Gas-Burners similar thereto, or only differing colourably therefrom.
16 & 17, King William Street, June, 1871.



THE
UNVARYING WATER-LINE GAS-METER.
(SANDERS AND DONOVAN'S PATENT.)

"Unquestionably the best Water Gas-Meter now in use."

Over 60,000 in action.

MANUFACTURERS:

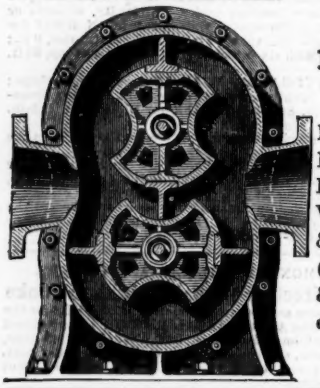
THE GAS-METER COMPANY,
KINGSLAND ROAD, LONDON;
WITH
Branch Manufactories at DUBLIN and OLDHAM.

ALEXANDER WRIGHT & CO.,
MANUFACTURERS OF
"WET" & "DRY" GAS-METERS
of the highest excellence.
STATION-METERS AND GOVERNORS.
STREET-LAMP REGULATORS.
TESTING APPARATUS
of the most perfect description for all purposes relating to Gas.

Just published, HANDBOOKS by F. W. HARTLEY:—
"PHOTOMETRY," 2s. 1d., post paid; "THE ESTIMATION OF AMMONIA AND SULPHUR IN GAS," 2s. 1d., post paid; "GAS-METER TESTING UNDER THE SALES OF GAS ACT," &c. (Second edition, revised and extended), 1s. 1d., post paid.

55 and 55A, MILLBANK STREET, WESTMINSTER, S.W.

LAIDLAW'S PATENT GAS EXHAUSTER.



R. LAIDLAW & SON,
GAS ENGINEERS, CONTRACTORS, IRON & BRASS FOUNDERS,
Iron-Works and Foundries, GLASGOW,
Meter-Works & Brass Foundry, EDINBURGH,

Manufacturers of GASOMETERS & GAS APPARATUS of EVERY DESCRIPTION; CAST-IRON PIPES, all sizes, cast in DRY SAND and VERTICALLY by PATENT MACHINERY; IRON ROOFS, COLUMNS, BEAMS, & GIRDERS; BOILERS, TANKS, & CISTERNS; VALVES, Screw, Rack and Pinion, &c., for Gas and Water, with Iron or Gun-Metal Facings, &c.; WROUGHT-IRON TUBE and FITTINGS for Gas, Water, or Steam; GAS-METERS (Wet and Dry) of the most approved Construction, STATION-METERS, GOVERNORS, &c.; GASELIERS, BRACKETS, PENDANTS, PILLARS, & GAS-FITTINGS of every description; LAMP-POSTS and LANTERNS for Streets, &c.

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D. HULETT and CO., 55 and 56, HIGH HOLBORN, LONDON,
PATENTEES and MANUFACTURERS of the ONLY GOOD MERCURIAL GAS REGULATOR,

Invite the attention of Gas Companies and the Trade generally to their Improved GAS-METERS, which they warrant equal to any in Quality, Workmanship, and Simplicity of Construction, and the only Meters from which Gas cannot be obtained without being duly registered.

MANUFACTURERS OF
GAS CHANDELIERS, GLASS LUSTRES, HALL LANTERNS, VESTIBULES, BRACKETS, PENDANTS;
DOUBLE CONE, ALBERT, SHADOWLESS, & EVERY DESCRIPTION OF BURNER, UNION JETS, BATSWINGS, ETC.;
IMPROVED FULL-WAY CARTER'S VALVES (much approved of);
GAS-STOVES, and every article connected with Gas Apparatus.
CAST & WROUGHT IRON PIPE, BLACK & GALVANIZED. COPPER, TIN, BRASS, & COMPOSITION TUBING.
D. HULETT'S IMPROVED SERVICE CLEANSER
for clearing out Mains, Services, and Interior Fittings—65s. net.
Boyle's Patent Silvered Glass Combination Reflectors and Outside Lanterns.
Sole Manufacturers of Church and Mann's Photometer.
Large Pattern-Books, with every description of Gas-Fittings, Chandeliers, &c., with complete Book of Prices, 12s.

London: Printed by WILLIAM BOUGHTON KING (at the office of Clayton and Co., 17, Bouverie Street, Fleet Street); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, July 4, 1871.